The New England
Journal of Medicine

VOLUME 208 JUNE 29, 1933 NUMBER 26

Massachusetts Medical Society

THE TREND OF MEDICINE IN THE TWENTIETH CENTURY*

BY CHANNING FROTHINGHAM, M.D.†

As practically one-third of the twentieth century is now behind us it seems an appropriate time to pause a moment in order to review some of the activities and achievements of the medical profession during this period, to examine the trend in certain of those activities and to indulge in that fascinating pastime of speculating upon what the future will reveal in regard to some of the medical problems. It is perhaps an unusually appropriate time for the profession to try to form a clear picture of the present trend in medicine because today in many branches of this broad field there are certain of our problems under discussion by the general public as well as by members of the profession. The solution of these problems is a matter of considerable importance to the medical profession and if they are to be solved in the manner that the profession desires the profession must take an active part in these discussions. To help guide the physicians in this task a survey of the existing situations in certain medical activities and a comparison with conditions as they existed in these same fields at the beginning of the century may be of interest. Obviously the whole field of medicine is too broad for one to attempt to cover it completely in a discourse of this sort. Among the activities, however, which it seemed to the speaker would be of interest to this audience are such as medical education, the department of public health, the nursing profession and the organization of the medical profession for the practice of medicine.

Despite any problems which may exist in medicine the bright spot which steadily shines is the progress that is made in our knowledge of disease. New discoveries are continually being made which clear up the etiology of some obscure condition, or add a specific form of therapy, or show how to eradicate or protect against, some disease. The number of important advances naturally varies in different generations but the profession may look with pride upon the discoveries which developed during the first third of the twentieth century. The introduction of the use of insulin in diabetes and extract from the liver in primary anemia mark this period with the mastery of two hitherto fatal diseases. The electrocardiogram and the determination of the basal metabolism have opened up our knowledge of cardiac disease and the mysteries of the thyroid respectively. The comparison between the methods of producing anesthesia at the beginning of the century when practically only ether or chloroform was used for continued anesthesia and the many elaborate mechanical devices employed now with numerous preparations which may be given by mouth or rectum, intravenously or intraspinally as well as by inhalation may be used to illustrate the progress made in adding to the comfort and welfare of the patient. However, it is not the aim of this discourse to enumerate or discuss the advances which have been made in the diagnosis, treatment and prevention of disease during the generation which has just passed. In the meetings of the different sections of this society, in the meetings of other societies and in the medical journals these facts are being continually presented.

In looking over the medical journals published at the beginning of the century one is amused at certain theories about diseases ill understood at that time which are open books to us today. For instance in an article on hay fever and asthma no mention of sensitiveness to plants or protein is made. It is interesting to speculate what procedures of the present day carried out with all sincerity by the profession will be discarded as absurd by the physicians in the latter part of this century just as we have discarded the promiscuous bleeding which was used as a therapeutic agent in bygone days and the absurd combinations of medicine which were given with enthusiasm to cure self-limited diseases. The headmaster of a prominent New England School was perhaps turning the light upon one of these absurdities when a few years ago he said "the tide has turned, we have one boy in the entering class who still has his tonsils." There is reason to hope that the custom of giving medicines for the psychological effect may eventually be discarded not only to the benefit

*The Annual Discourse delivered at the Annual Meeting of the Massachusetts Medical Society, Boston, June 7, 1933.

†Frothingham—Physician-in-Chief, Faulkner Hospital. For record and address of author see "This Week's Issue," page 1384.

of the patient and his pocketbook but also to the embarrassment of the cults. For certainly a great measure of the success of the cults depends upon the improper handling of so-called functional problems by the medical profession. But let us return to a discussion of those medical activities mentioned above which have been selected for today's talk.

The education of the undergraduate medical student and the provisions for physicians to continue their studies after taking up the practice of medicine will ever be living issues. Very pronounced changes in these fields have been made during the first third of this century. It is by no means established that the best program for teaching medical students has been developed. The restlessness of the medical educators in regard to their curricula and the changes which are made every few years prove that the whole problem is in a transitory stage. The expression used naturally above "teaching medical students" is indicative of the author's failure to keep abreast of modern education because nowadays teaching anyone anything seems to be considered old-fashioned and in place of that the student should simply be given the opportunity to learn and be stimulated and guided in so doing.

If one compares the medical schools of today with those same schools as they were thirty years ago interesting points are brought to light. Let us take for examples the three medical schools in this Commonwealth which are recognized by your society as efficient schools. The increase in the combined annual budgets of these three schools has been about 500 per cent having risen from about $217,000 to about $1,287,000. During this same period the membership in the faculty and teaching forces has increased from 297 to 967, or about 220 per cent. This of course includes the research workers of both periods. On the other hand the students in these three schools during this period have only changed from 885 to 1224, an increase of about 40 per cent, which is quite in contrast to the increase of over 220 per cent in teachers and 500 per cent in expended money. If the number of teachers and students continues to increase at this same proportion it will not be long before there will be many more instructors than students in our schools. This proportion of teachers to students seems to be a peculiarity of medical education as compared with other professional or undergraduate schools. The question may well be raised, is this essential or desirable?

The failure of the number of medical students to increase in proportion to the number of instructors and the amount of money involved in medical education is of course in part due to the tendency for medical schools to limit the number of students. There is considerable feeling, which is growing, that the schools of this country are not doing their duty to the public by this limitation. The argument that medical education requires certain laboratory and other equipment of an elaborate nature and therefore only a limited number of students can be properly handled, hardly seems a sound one when one considers that thirty years ago with much less money and fewer teachers satisfactory medical education was given by our schools to a relatively larger number of students. Some reorganization of the methods of teaching might well be worked out so that larger numbers of students could be cared for with the present financial outlay and numbers on the teaching staffs.

An editorial in your *Journal* has recently called attention to the fact that there are about 13,000 students eligible to study medicine each year but only about 6000 are taken into our schools. Of the 7000 who may not matriculate in our schools about 2000 go to foreign universities to study medicine, leaving 5000 potential medical students who are deprived of the opportunity to study medicine. No one can say how many Pasteurs there might be in this group who are being driven from adding to the welfare of the human race through the profession of medicine by this limitation of enrollment in our medical schools. Presumably a reasonable number of these 2000 students who go to other countries to study medicine eventually return to this country to practice medicine. If one believes in our educational institutions, would it not be better to give them the advantages of education in this country rather than to force them into foreign lands for a possibly inferior medical education? It is considered by many a fundamental error on the part of our educational institutions not to provide opportunity for higher education to those who qualify in the preliminary stages and are desirous of continuing.

During the first third of the twentieth century the population of Massachusetts has increased about 51 per cent from 2,805,346 to 4,249,614 while the number of physicians licensed to practice medicine has only increased about 20 per cent from 5497 to 6595. The difference between the increase of 20 per cent in the physicians licensed to practice and the increase of 40 per cent in the number of medical students in this period is probably due to the numerous opportunities for work for graduates from medical schools which do not require a license from the State for participation in them. Such opportunities are steadily increasing in the profession of medicine and therefore this discrepancy between the number of graduates of our medical schools and those who go into the practice of medicine in some form will probably increase. With the population increasing more

rapidly than the number of medical students and over twice as rapidly as the number of physicians who go into the practice of medicine the development of a shortage of physicians for the care of the public may soon develop. This is another reason for serious consideration on the part of those who control the admission of students to our medical schools about their policy of arbitrary limitation in the number of students.

It is difficult to believe today that at the beginning of this century serious discussion was going on in regard to the value of bedside teaching in the clinical subjects. It certainly would seem strange today to think of trying to learn medicine without having the student in close contact with the patient. Changes, which are of considerable interest, in the curricula of the medical schools have been gradually developing during this century. In the Harvard Medical School which I have taken as an example 2160 hours at the present time are given to clinical work as compared with 1968 hours for the clinical subjects thirty years ago, an increase of about 10 per cent. In the preclinical subjects the number of hours per year, however, has dropped from 2129 to 1432, a decrease of about 33 per cent. While these changes have been going on, due to the trend of the times to eliminate fixed exercises in teaching and give the students more opportunity for reading and thought, there has been a general diminution of about 12 per cent in the total number of hours for fixed exercises in the Harvard curriculum. These figures may be of interest to those who fear that with the rapidly increasing mass of knowledge too much attention is devoted in medical schools to the scientific aspects of the different subjects and not enough to the clinical application of the established facts.

It is also of interest especially to those of us who feel that specialism might well be relegated to postgraduate medical study to note that during this period the tendency has been to increase the number of hours devoted to the four general subjects, Medicine, Surgery, Pediatries and Obstetrics, and to decrease the number of hours devoted to the clinical specialties. A striking exception has been the increase in the number of hours devoted to Psychiatry which in the Harvard Medical School has increased over 250 per cent. The same is true of the other schools in this State in regard to Psychiatry. The increase in the time devoted to this subject shows that at last a realization has developed of the importance of environment to many of our problems of illness.

Before leaving the subject of medical education our attention should be turned for a moment to the opportunities offered to practicing physicians for postgraduate instruction. The discoveries in regard to the etiology, treatment and prevention of disease come so rapidly that it takes considerable planning to see that the practicing physician can be given an opportunity to keep up to date. The busy practitioner may have his time so filled that it is difficult for him to attend meetings or carry on graduate study, or his location may be so isolated that it is hard for him to make contacts with opportunities to learn the new advances in diagnosis and treatment. Improvement in transportation, making it easier to reach the medical centers in order to hear about the new things, tends to eliminate the latter difficulty and thought should be given to the organization of one's practice so that time may be taken off for study and attendance upon medical meetings. The problem, therefore, calls for the development of opportunities for study for the practitioners and their organization of their work so that they can avail themselves of the opportunities offered.

The tendency for individuals doing the same kind of work to combine for practice gives an opportunity for individual members of the group from time to time to take up graduate study or to visit other clinics in order to learn about the recent advances. Unfortunately during this century the advances in the development of opportunities for graduate teaching have not been striking. Although there has been some elaboration of the courses for graduates offered during the winter and summer by our medical schools the attendance has not been impressive enough to make one feel certain that this is the best way to organize this work. An attempt to send teachers into the outlying districts rather than to have the individual doctor come to the medical center so that more physicians can be reached with a minimum loss of time to the practitioners has been making some headway.

Recently your Society has been active in trying to work out some program for the busy practitioners so that they may keep up to date with a minimum loss of time. Just what will be recommended is unsettled but perhaps the utilization of various hospitals scattered throughout a community for graduate teaching by means of clinics arranged to cover the advances in the various fields may be the proper solution. These clinics can be given by the staffs in the larger centers and in the smaller cities and towns by instructors from the teaching centers. Every effort should be made by this Society to provide graduate instruction so that it may be easily obtained by those members who wish it and forced upon those who do not clamor for it.

In connection with this problem of postgraduate instruction for the practitioners the medical journals of course have been of tremendous service. It is interesting to note that since the beginning of the century there has been a drop in the number of medical journals in this country and Canada from about 250 to about 210.

This is a decrease of approximately 16 per cent. This diminution in the number of medical journals is apparently due to the elimination of the smaller and less well-known journals because of the better-known ones practically all have survived and new ones of importance added to the list. Presumably, therefore, this method of offering graduate instruction shows no signs of deterioration.

If the author may be permitted to speculate on the future of medical education he predicts that eventually the number of instructors in relation to the students will be diminished especially in the clinical branches in which the existing ratio seems unnecessary. He also predicts that the chiefs of the clinics will in great measure retire from private practice in order to devote their entire time to the organization of their clinics for the care of the patients and the teaching of students and to participation in and the stimulation of research. The argument of bygone days that the head of the clinic should continue to do some private practice in order to make him a better teacher seems unimportant. Of course experience in private practice is an important factor in developing a man for a professorship and the head of a clinic, but there is little evidence that after reaching that position it is necessary or desirable for the professor to continue in that part of medical work. It seems reasonable to believe that he will do better work for his university if he eliminates the time-consuming factors of private practice. The question is also raised whether the chief of clinic and professor with all his other duties is able to render so efficient or prompt service to the patient. Still another prediction is that the training of specialists will be better organized in the future and some more definite standards established so that one may not become a specialist just by assuming the title.

The increase in the activities of the Department of Public Health of the Commonwealth of Massachusetts during the twentieth century has been very striking. This department was created in 1914 to supersede the old State Board of Health and to include in its duties the management of some of the hospitals which are run by the Commonwealth. Thus the department found itself not only involved in protecting the health of the citizens or so-called preventive medicine but also in the treatment of patients, namely, practical therapeutics. If the Department of Public Health is going to continue to take part in the practice of medicine the question may well be raised, why should not eventually all the hospitals which are managed by the Commonwealth be included under this department? Because the activities of the Department of Mental Diseases are so extensive it may seem a bit startling to suggest including them in the Department of Public Health, but it is also somewhat illogical to have different types of disease treated by different departments in these days when the tendency is to try to treat the individual as a whole.

To emphasize the growth and far-reaching activities of the Department of Public Health is difficult. Perhaps one way is to call attention to the fact that in thirty years the budget of this department compared with the budgets for those bodies grouped in the present department has increased from about $130,000 to $2,365,000, an increase of about 1700 per cent. These figures do not include $1,039,000 for the special building program for hospitals of a recent year as compared with a special appropriation of $110,000 for the same purpose in a year at the beginning of the century.

This increase of 1700 per cent in the amount of money expended on public health problems is especially interesting in view of the fact that the population of the Commonwealth has only increased 51 per cent in this period and the whole state budget only about 700 per cent. Certainly this relative increase in the expense per capita for public health service cannot be accounted for by the increase in the cost of living, et cetera, during the past thirty years. It should mean more activities and more service on the part of the Department of Public Health than existed at the beginning of the century. Let us analyze the situation in order to see if such is the case and let us examine with a critical eye to see if we approve of these increased activities and this added burden to the tax payers. Let us also consider whether some of the activities engaged in by the Department of Public Health should not preferably be performed by the individual physician or the local community. Is not perhaps the department interfering with the activities of the individual physician and making it more difficult for him to secure an adequate income from the practice of medicine? Of course in this regard the question also comes up as to whether the department or the individual physician can render better service in the activities undertaken by the department.

A glance at the latest report of the Department of Public Health in comparison with the report of the State Board of Health at the beginning of the century will show that the activities of the present Department are much more numerous and that the amount of work in the same activities as existed then has increased tremendously. For example the prosecutions by the Commonwealth for violations of the laws regarding food and drugs in 1931 were 324 as compared with 95 in 1901, an increase of 240 per cent. It is interesting to note that there has been no diminution in the excellence of this work with the increase in its amount because in 1931 94 per cent of convictions was obtained as compared with 93 per cent in 1901.

The expansion in the number of hospitals

for the care of tuberculosis has also been remarkable in this period. At the beginning of the century there was only one hospital run by the Commonwealth for this purpose, which was at Rutland. At that time this hospital had a daily average of 168 patients and 65 employees. In 1931 the daily average of patients was 361 and the employees 203. Besides the hospital at Rutland at the present time there are hospitals for the treatment of this disease at Lakeville, North Reading and Westfield. In addition to these hospitals the Commonwealth pays a subsidy to various cities and towns to help them care for their patients with tuberculosis in local hospitals.

Among the new activities which the department has been gradually assuming are the problems of Adult Hygiene and Child Hygiene. In addition the Commonwealth has recently taken up certain aspects of the cancer problem and has a hospital for the treatment and care of some of those unfortunates at Pondville.

It is interesting to note that in the index of the report of the State Board of Health in 1901 the words *gonorrhea* and *syphilis* did not appear. Fortunately our present department of health is endeavoring to help eradicate these diseases which cause so much suffering and economic waste. The Department is also expending much time and energy combating certain diseases of epidemic importance which have become more prevalent during this century. Poliomyelitis is an example of such a disease for in 1901 there were no cases of poliomyelitis mentioned in the report of the board as occurring in the Commonwealth while in 1931 1,428 cases of this disease are recorded.

In addition to trying to eliminate preventable disease by sanitary measures and to taking part in the practice of medicine so far as the care of certain diseases such as tuberculosis and cancer, the department takes charge of the production and free distribution for use by physicians of materials to treat disease such as antisera and for the prevention of disease such as vaccines against typhoid and virus to combat smallpox. The laboratories of the department are available to the physicians of the Commonwealth for diagnostic procedures essential to the proper practice of medicine.

The educational activities of the department through its division of adult and child hygiene are pronounced. Usually at the request of local communities demonstrations are given in order to show the proper way for learning the early detection of certain diseases or how to protect against preventable disease. In the child hygiene division problems in dentistry and eradication of diphtheria receive special attention. In addition to the educational program put on by demonstrations, et cetera, the department edits various publications of an instructive nature suitable both for the layman and physician.

No attempt will be made to enumerate all the activities of the department, but I think it will be obvious from the above that the citizens of the Commonwealth are receiving a proper return from the Department of Public Health despite the tremendous increase in expenditure for this work during the present century. It is interesting to note that the report of the Department with all its added activities was included in a volume of 225 pages while the report of the State Board of Health alone in 1901 appeared in a volume of 615 pages. This suggests that the trend is for more action and less talk on the part of these public servants at the present time.

Attention should also be called to the persistent agitation on the part of certain citizens in this Commonwealth to increase the activities of the Department. The attempt to have a hospital established for the care of cases with chronic arthritis a year or so ago is an example of this.

It seems quite clear that the department is doing its work as well as the individual physician can do it and therefore there is no criticism on this score in having the department extend its activities. The question of whether the department should engage in these activities rather than to have the individual physician or the local health authorities do it presents a more complicated problem. From talks with the Commissioner I obtain the impression that his activities in the different communities along educational and preventive lines are practically always at the request of some groups although not always by the physicians in the community. I also gather the impression that the Commissioner would be only too glad to have the local communities take over many of the activities of his department but he finds that often they are not prepared to do so. From a purely selfish point of view it is interesting to realize that the business of the local physicians in prophylactic procedures among private patients has practically always improved in those communities in which the department has aided in giving advice about and providing actual preventive measures against such a disease as diphtheria.

A much more delicate problem for the department than the dissemination of advice about the prevention of disease and the assistance it gives in prophylactic procedures is the fact that the department is actually taking care of sick people and the tendency is for this activity of the department to broaden rather than shrink. The Department of Public Welfare looks after those who are needy, be they well or ill. The Department of Public Health, however, should offer the same opportunities to all the citizens, rich or poor, and it seems reasonable that unrest should appear among the physicians who fear that eventually this tendency on the part of

the department may lead to so-called State Medicine and the elimination of private practice. This tendency of the department is in reality a challenge to the medical profession because if the physicians individually and the communities locally will only provide satisfactory treatment for the patients who need it there will be no invasion of that community by the Department of Public Health. It is only when the proper facilities for the best care of patients are lacking in a given community and the department is called upon to help out that it steps in. My impression is that the Commissioner would be only too glad to restrict his activities to sanitation and general problems in preventive medicine and to supplying materials and laboratory facilities to the physicians. The tendency to force the care of the ill upon the Department of Public Health is not looked upon by the Commissioner with enthusiasm. On the other hand, who can blame him for wanting to offer the best advice in the eradication of disease or to offer proper facilities for care in cases where the physician and the local communities are not doing as good work as the department can do? It is also often exceedingly difficult to separate the care of the individual ill patient from the health of the community and therefore the problems of preventive medicine and curative medicine must overlap.

Speculation in regard to what the Department of Public Health will be doing later in the century is difficult. It seems quite certain that it will expand along the lines of increased laboratory facilities and the preparation of specific materials for prevention and treatment of disease. It will be ever active in trying to eliminate preventable disease from the Commonwealth as well as helping to find the cause of disease and the source of epidemics. It must continue to expand in its activities in helping to enforce the laws of sanitation, pure food, et cetera. The speaker feels less certain, however, about the department's continuance in the practice of medicine. As hinted above it seems possible that the custom of the Commonwealth to take care of individual diseases in isolated groups such as mental disorder, cancer and tuberculosis might well be replaced by some more comprehensive plan. Certainly there are many objections to this method of isolated hospitals for a particular disease as will be brought out later. Should the Commonwealth go into the practice of medicine more extensively on a broader basis, it is hard to predict whether this work would be made a subdivision of the Department of Public Health or a new department. Perhaps the State will retire from the practice of medicine. This, however, seems unlikely.

During the first third of this century the developments in the nursing profession have been numerous. Many changes have taken place and there are many problems at the present moment in need of solution. For instance at present there are no laws controlling the practice of nursing in this community. Any one can pose as a trained nurse. By the system of registration of nurses some attempt is being made by the Commonwealth to designate those who are especially trained in the nursing profession. Whether nurses should be licensed in the same way that physicians are is a question for consideration at least. The public is only slowly awakening to the realization of what the significance of registration is in the nursing profession.

The increase in the production of trained nurses in this country as a whole is also a serious problem. At the beginning of the century there were 432 training schools for nurses and about 11,000 pupil nurses in training. In 1930 there were about 1800 training schools with over 100,000 pupils in training, an increase of over 800 per cent. This increase is in marked contrast to the increase in the number of physicians or the population. Already before the general depression set in the nurses were beginning to have pronounced unemployment and now the situation is rapidly becoming serious. The trustees of hospitals are glad to have training schools because they are a financial saving to the institution and therefore they are loath to give up the school in their own hospital. Perhaps the failure of many of the nurses to make a living at their profession may eventually cut down the number who go into training, but it seems as though many hospitals should seriously consider giving up their training schools in order to help in cutting down this excessive production of trained nurses and use graduate nurses for running their plants. Of course the question of which hospitals will add to their expenses by hiring graduate nurses and give up this financial assistance from the training schools is the stumbling block.

The education of the trained nurse has gone through many changes during the last thirty years. In this period educational requirements for admission to training schools have appeared and have been gradually increased and now the work in some training schools may count toward an academic degree in about fifty of our colleges. During this time instructors have made their appearance in the schools so that the young women are instructed in their profession rather than just picking it up in odd ways. With this improvement in the education of the trained nurse the opportunities open to them other than the actual nursing of ill people have increased. For example many nurses go into administrative jobs or public health work, while others become expert in giving anesthetics, act as operating assistants or work among the school children. Although it is a distinct convenience for the physician to have a well-educated and trained woman help in caring for a sick person it is

not by any means always necessary. Naturally, however, the person who has put more time and study into her education is entitled to more compensation than the less well-trained individual. This makes the modern trained nurse too expensive a luxury for many cases in which a less well-trained individual would be good enough for the nursing that is needed.

The nursing profession should arrange to train some women to be practical nurses as well as to educate others more elaborately. Already there are some schools for this purpose. In the future perhaps some of the training schools in the smaller hospitals may be devoted to this. It is not clear to the speaker why the better schools should not turn out women with different grades of training as nurses just as a university turns out graduates with different degrees of education, but the leaders of the nursing profession in this community at least do not think that this is practical. Perhaps in the future some such plan may be worked out.

The place where the special nursing is done has changed considerably with the increasing use of hospitals for the care of the ill, especially private patients. During the month of March, of 1600 calls at the Central Directory in Boston for special work all but one per cent were for work in hospitals instead of in private homes. Some apprehension has been expressed by physicians that with this tendency to elaborate the education of the trained nurse she may be too well trained to be of practical service. The speaker does not have this apprehension but feels that the better trained the nurse is the more effective she becomes other things being equal. My prediction is that there will be no let-up in the extent of the curriculum in the better schools. Why should not the nurse in training pay for her education just as students in other schools or colleges? Perhaps if a tuition fee were charged the overproduction of nurses might tend to correct itself.

The character of the practice of medicine has been going through pronounced changes in recent years and presumably will continue to do so for some time. At the beginning of the century the old-fashioned general practitioner had already begun to disappear and this type of physician should soon cease to exist. This is only just because diagnostic and therapeutic procedures have progressed to the point that no one individual could possibly be able to carry them all out in an acceptable manner. With this elimination of the general practitioner specialists have been increasing in numbers and more and more physicians are contracting their work into narrower fields. As Cheever pointed out in his Annual Discourse in 1925 specialism is not a recent development but has existed in medicine for over a century and perhaps always. However, the relative proportion of specialists has lately increased with rapidity. The result has been that the layman especially in the larger centers has often been at sea in regard to the best way to begin to handle his medical problems. Instead of consulting some physician who is trained to look upon his medical problems from a broad point of view he may find himself consulting some specialist with a very limited field of medical activity as it is difficult for the layman to know just what type of work the individual physician does. This confusion in regard to whom the layman should originally consult may add considerably to the expense of the illness and also detract from the efficiency of the service. Not only is the layman confused in regard to whom to turn, but the doctors themselves have not worked out any definite program of organization for rendering the best medical service. Various combinations of physicians have been tried and clinics of different types organized but it is still an unsettled question as to what is the most satisfactory organization and very likely different plans will be necessary for different localities.

In addition to the changes in the character of medical practice that have been going on the expense of medical care has increased to such an extent that there is appreciable agitation upon the subject by the laity. Considerable time and money have been spent by various groups in studying this problem and from one of these studies, namely, the one made by the Committee on the Costs of Medical Care specific suggestions have been made with the hope of solving some of the difficulties. These suggestions have started considerable discussion and have by no means been universally approved by the medical profession, in fact the committee itself could not reach a unanimous agreement on what was the best way to solve these problems of the costs of medical care.

Obviously in the long run the best of medical service will be the cheapest. We all are only too familiar with the picture of some individual who has wasted money on the cults or on poorly organized medical care or on poorly rendered medical service so that finally there has been unnecessary duplication of expenses. Therefore, not only in order to render the best service to the individual should the profession organize itself, but also in order to do its share toward solving this many-sided problem of the costs of medical care should it organize to give the public in the home, in the office and in the hospital the best of care.

Having worked out among ourselves the way to deliver the best medical service to the public, the public should in turn be educated up to a realization of what it ought to receive from the profession. Of course the profession is trying to do this and the transitions in the character of the practice of medicine and the organization of hospital services are the result of these efforts. At the present time, however, medical

service is by no means ideal and the public is certainly far from realizing the way to secure the best medical service.

Instead of discussing the various trends in the organization of the profession for rendering service to the public I shall outline what seems to be the best program, calling attention to where the existing customs on the part of the public and physician deviate from the plan to the detriment of the service rendered and to an increase in the costs. There are two chief features of this program, namely, the work of the physicians and the organization of the hospitals.

The pivotal point of the whole ideal scheme is the successor to the old general practitioner whom for lack of a better name let us call the family medical adviser. If the public could be taught that each individual or family should have a family medical adviser to whom the patient will aways go no matter what the problem is, a tremendous step in advance toward receiving the best of medical service will have been made for the patient. The tendency for patients to go directly to some one specialist all too often leads to poor medical serviee because of that lack of knowledge of the patient's environment which the family medical adviser will have.

The next important point in the program is to have it clearly understood what this family medical adviser should be and do. He should of course be a well-trained physician. It is for this reason that the profession should be ever active in keeping up the standards for medical education in the Commonwealth. He should be thorough in his examinations and study of all patients. The more vague the symptoms the more intensive the study should be. Fortunately the tendency of some members of the profession to treat symptoms without making a definite diagnosis as to their cause is diminishing, but unfortunately we still meet at times evidence of this pernicious habit. I cannot help but wonder if the "office hour" may not be responsible for this in part. With the crowded waiting room it is only natural to hurry with resulting errors of omission as well as judgment. It would be a distinct step forward if the family medical adviser would only see patients by appointment. This physician should only refer his patients to specialists for tests which require some technical skill that he is unable to perform or in some cases to receive the judgment of the consultant of broader experience. The report of the specialist or consultant should be used by the family medical adviser to help him make the final diagnosis and not just accepted blindly as correct.

In regard to treatment the family medical adviser should take care of as many of the ills of his patient as he is competent from his training and his equipment to treat successfully. The others should be sent to the appropriate specialist for treatment. The family medical adviser should be the man to make the so-called periodic health examinations and not some group of physicians without any knowledge of the patient or his environment. In order for the family medical adviser to keep up with the progress in medicine he should be associated with some other physician doing the same type of work in order that one or the other may have time off for vacations and for study and still have their service available for their clientele at all times. This family medical adviser must also have confidence in himself and not be overawed by the opinions of the specialists.

The next important step in the organization of the medical profession for rendering the best service is to make it clear what a specialist should be and do. In the first place there should be some method by which the fact could be established that a physician is qualified to consider himself a specialist. He should be a man who by special study in a limited field has perfected himself in the use of some diagnostic procedure that is too complicated for the average physician such as cystoscopy or he should be an individual who has learned some special procedures in the way of treatment that are too complicated for the busy family medical adviser to undertake, such as various surgical procedures.

If the specialist would make it a rule only to see cases in consultation with other doctors one of the important causes of poor medical serviee would be removed. The tendency for patients to go directly to specialists who are unfamiliar with the patient's home conditions and other problems, the failure of the specialist, often at the patient's request, to articulate with the family medical adviser, and the tendency to send a patient to another or to several other specialists often result in unsatisfactory conclusions being reached in regard to diagnosis and suggestions for treatment to say nothing about the extra expenses. Frequently these patients have no physician whom they look upon as their family medical adviser which makes it difficult for the specialist to find some one with whom to articulate, but it is to just such a patient that the specialist should show the need of a family medical adviser.

If the specialist would only see cases in consultation and not allow patients to come directly to him, this unfortunate habit of the patient of diagnosing his own case and picking his own specialist would diminish and might even entirely disappear. Although many physicians say that they are specialists or consultants and only see patients referred by other physicians very few in fact, one might almost say none, live up to this in practice because almost all will make appointments with patients for consultations and treatment in the office or hospital without insisting that the patient be referred by the family adviser.

In this program for rendering the best medical service to the public the position of the pediatrician should be defined. Is he to be looked upon as a specialist or as the family medical adviser for the early years of life? Although at the beginning of the century he was obviously a specialist who was called in consultation by the general practitioner or by some other specialist, as the obstetrician, usually for feeding problems, his position in medicine is now changed and the pediatrician usually takes charge of the baby completely at birth and continues to look after the child for some years. The inability of many modern mothers to nurse their babies successfully has increased the demand for pediatricians. At first the pediatricians were pretty well limited to the larger centers but now cities of all sizes have physicians who are especially interested in the care of children and even in the smaller towns one frequently finds an individual who prefers to confine his work to pediatrics. It seems best, therefore, in this ideal scheme for the practice of medicine to look upon the pediatrician as a family medical adviser for the young rather than as a specialist.

It is of course difficult to draw a sharp line as to when the pediatrician as the family medical adviser of the infants and children will be replaced by the family medical adviser for the whole family and there is bound to be overlapping. The family medical adviser on going downstairs, having pronounced that George and Ethel aged fourteen years and sixteen years respectively have chicken pox, will occasionally meet the pediatrician at the door who has been called in to see the baby because he has some eruption which looks like water blisters. On the whole, however, these overlaps are rather unusual and with the numerous problems peculiar to children such as feeding, deficiency diseases and prophylactic procedures it seems reasonable to have a group of advisers who limit their activity to children. If there is going to be this subdivision of the family medical advisers, however, it is important that the pediatricians tackle the problems of the infants and children as a whole and appreciate the relationship of their environment to their medical problems. My guess is that the pediatrician is here to stay but it is conceivable that as time goes on and these problems of feedings, et cetera, are more clearly established, the family medical adviser may reach out to reclaim the care of the babies and children as part of his field.

Mention was just made of prophylactic procedures especially those applied to children and it is of interest to note the changes that have taken place in these procedures during this century. At the beginning of the century vaccination against smallpox was about all that was deemed necessary in the way of prophylaxis against the usual diseases of childhood. One of our leading pediatricians tells me that today in addition to vaccination against smallpox, inoculations against diphtheria should be done at about one year of age and after six months if the Schick test is positive a repetition of this procedure should be carried out. Furthermore in order to avoid the various deficiency diseases at the age of one month there should be introduced into the diet such vitamin-containing substances as cod liver oil and orange juice. Egg yolk, leafy vegetables and even iron should be added at about six months. For children over five years of age if they attend summer camps or travel, typhoid inoculations are recommended and should be repeated every two years. Also as a prevention against certain infectious diseases the milk for children is now pretty generally boiled or pasteurized. Other preventive measures have been suggested from time to time such as vaccination against pertussis, convalescent serum against measles, et cetera, but these measures have not become as yet a routine procedure.

Besides these prophylactic procedures for the welfare of the infants and children, the pediatricians and school officials have worked out elaborate rules of quarantine against contagious diseases in our public schools. Would that some statistician could discover whether the time lost by quarantine is more or less than used to be lost by the diseases. When one sees the misery of adults, if they pick up in later life these contagious diseases of childhood, especially the milder ones, it makes one wonder if this time lost by quarantine is really worth while. Perhaps, however, there is reasonable hope that in the future it will not be necessary for individuals to have mumps, measles, pertussis or chicken pox just as now we feel that diphtheria and smallpox may be avoided.

With the established prophylactic procedures and the new ones continually being advocated the cost of their application must be considered especially in these days of financial difficulty. The prophylactic procedures become a real problem to the young couple who wish to raise a family and the question of how many of these procedures it is necessary or wise to carry out often becomes a very pertinent one. Furthermore, the question may well be raised, do these procedures have any ultimate effect upon the human organism especially those that involve the introduction of foreign serums into the system? Each family medical adviser be he pediatrician or internist must adopt some program for his patients in regard to prophylactic measures. It may well be that at the present time there will be considerable difference in the programs of different physicians. The speaker is inclined to recommend specific prophylactic measures only against those diseases which are serious and for which we have no specific therapy such as typhoid fever and smallpox. In addition if due to hygienic conditions a disease for

n this program for rendering the best medi- service to the public the position of the iatrician should be defined. Is he to be ked upon as a specialist or as the family ical adviser for the early years of life? Al- ugh at the beginning of the century he was iously a specialist who was called in consul- on by the general practitioner or by some er specialist, as the obstetrician, usually for ding problems, his position in medicine is changed and the pediatrician usually takes rge of the baby completely at birth and con- ues to look after the child for some years. inability of many modern mothers to nurse ir babies successfully has increased the de- nd for pediatricians. At first the pediatri- ns were pretty well limited to the larger cen- but now cities of all sizes have physicians o are especially interested in the care of chil- n and even in the smaller towns one fre- ntly finds an individual who prefers to con- his work to pediatrics. It seems best, there- e, in this ideal scheme for the practice of licine to look upon the pediatrician as a fam- medical adviser for the young rather than specialist.

t is of course difficult to draw a sharp line o when the pediatrician as the family medi- adviser of the infants and children will be laced by the family medical adviser for the le family and there is bound to be overlap- g. The family medical adviser on going nstairs, having pronounced that George and el aged fourteen years and sixteen years pectively have chicken pox, will occasionally t the pediatrician at the door who has been ed in to see the baby because he has some ption which looks like water blisters. On whole, however, these overlaps are rather sual and with the numerous problems pe- ar to children such as feeding, deficiency dis- s and prophylactic procedures it seems rea- able to have a group of advisers who limit r activity to children. If there is going to his subdivision of the family medical ad- rs, however, it is important that the pediatri- s tackle the problems of the infants and dren as a whole and appreciate the relation- of their environment to their medical prob- s. My guess is that the pediatrician is here tay but it is conceivable that as time goes nd these problems of feedings, et cetera, are e clearly established, the family medical ad- r may reach out to reclaim the care of the es and children as part of his field.

ention was just made of prophylactic pro- ures especially those applied to children and s of interest to note the changes that have n place in these procedures during this ury. At the beginning of the century vac- tion against smallpox was about all that deemed necessary in the way of prophylaxis nst the usual diseases of childhood. One of our leading pediatricians tells me that to- day in addition to vaccination against small- pox, inoculations against diphtheria should be done at about one year of age and after six months if the Schick test is positive a repetition of this procedure should be carried out. Fur- thermore in order to avoid the various deficiency diseases at the age of one month there should be introduced into the diet such vitamin-contain- ing substances as cod liver oil and orange juice. Egg yolk, leafy vegetables and even iron should be added at about six months. For children over five years of age if they attend summer camps or travel, typhoid inoculations are recommended and should be repeated every two years. Also as a prevention against certain infectious diseases the milk for children is now pretty generally boiled or pasteurized. Other preventive meas- ures have been suggested from time to time such as vaccination against pertussis, convalescent se- rum against measles, et cetera, but these meas- ures have not become as yet a routine procedure.

Besides these prophylactic procedures for the welfare of the infants and children, the pediatri- cians and school officials have worked out elab- orate rules of quarantine against contagious dis- eases in our public schools. Would that some statistician could discover whether the time lost by quarantine is more or less than used to be lost by the diseases. When one sees the mis- ery of adults, if they pick up in later life these contagious diseases of childhood, especially the milder ones, it makes one wonder if this time lost by quarantine is really worth while. Per- haps, however, there is reasonable hope that in the future it will not be necessary for individuals to have mumps, measles, pertussis or chicken pox just as now we feel that diphtheria and small- pox may be avoided.

With the established prophylactic procedures and the new ones continually being advocated the cost of their application must be considered especially in these days of financial difficulty. The prophylactic procedures become a real prob- lem to the young couple who wish to raise a family and the question of how many of these procedures it is necessary or wise to carry out often becomes a very pertinent one. Further- more, the question may well be raised, do these procedures have any ultimate effect upon the human organism especially those that involve the introduction of foreign serums into the system? Each family medical adviser be he pediatrician or internist must adopt some pro- gram for his patients in regard to prophylactic measures. It may well be that at the present time there will be considerable difference in the programs of different physicians. The speaker is inclined to recommend specific prophylactic measures only against those diseases which are serious and for which we have no specific thera- py such as typhoid fever and smallpox. In addi- tion if due to hygienic conditions a disease for

which we have a specific remedy is prevalent such as diphtheria, prophylactic inoculations may be recommended. Care to avoid deficiency diseases and protection against infected milk should of course be employed.

To establish the above ideal system of organization of the physicians for rendering medical service it would take very little change on the part of the physicians. By so doing much duplication of expense would be saved. Mistakes in diagnosis, in which functional upsets are considered organic disease, would be less. The family medical adviser at much less cost would do many of the things for which the public now consults the specialists at increased cost. To educate the public up to the employment of this ideal system will be more difficult but with suitable publicity and persistence it seems by no means impossible especially if emphasis is placed upon the improvement in service and saving in expense.

In addition to the organization of the individual physicians to render better service the hospitals could be changed in certain particulars with benefit to the character of the service and with economy. The first change that should be made is to eliminate the isolated hospital for some special disease or group of diseases. The time has gone by when one part of the body can be studied and treated intelligently without considering the patient as a whole except for simple and obvious disorders. To study the patient as a whole, complicated and expensive apparatus is necessary and physicians expert in different fields are desirable. Therefore, each hospital should be equipped for complete study of the patient and being so equipped should not limit itself to just one field of work. Because of the expense these hospitals that do limit their work to some special line are not fully equipped to study the patient as a whole often to the detriment of the patient. The most striking example of this isolation of hospitals for special purposes is the hospital for mental disease but we also have hospitals for obstetrical work and gynecology as isolated units. Let us organize our hospitals as complete units equipped to study and treat all types of disease thoroughly so that the absurdity of transferring a patient who becomes somewhat irrational to another hospital for care rather than to another division of the same hospital may be avoided. The size of these complete hospitals may vary but the completeness should not.

In the ideal arrangement for hospital service changes in the usual program for the study of patients should also be made. The plan of assigning a patient to some special service for treatment such as surgical, otological, neurological, et cetera, on a guess in regard to the diagnosis from the patient's story by some admitting officer should of course be changed. As has been brought out above these specialists should be used for certain details of diagnosis or for special types of treatment, the former of which should only be instituted after general studies have been made and the latter only after the diagnosis has been established. It may be argued that these special groups can diagnose the patient just as well as a general diagnostic service. On this subject there may well be some difference of opinion from a theoretical point of view. From actual experience, however, the methods of procedure between the special clinics and the general diagnostic service differ so much that the two cannot be reconciled as equally efficient both from the point of view of economy and efficiency.

In both the out-patient departments and wards of our hospitals all of the patients should be admitted to the service which we will designate as the diagnostic service just as in practice in the homes and offices, the patients should consult the family medical adviser. On this diagnostic service all the physicians and surgeons of the hospital should be grouped so that the patients will have the advantage of special diagnostic procedures and the specialists will have the advantage of contact with general medical problems. From this diagnostic service the patients should be diverted to appropriate specialists for treatments that require their special services. Obviously certain types of cases with a clear diagnosis would tarry but a moment on the diagnostic service and quickly be sent to the specialist be he surgeon, obstetrician, psychiatrist, et cetera, for treatment or special observation. Other cases would be under study for some time by the diagnostic group until the diagnosis is settled. Thus the shuttling back and forth from one service to another with the unnecessary duplication of work and added expense would be avoided. Uniformity of diagnostic procedure which might meet with the approval of the entire staff would be established for all patients so that at least errors of omission would be avoided.

My hope is that the distinct trend at the present time toward making hospitals more complete units for all diseases will continue as the century progresses. May the development of the diagnostic service in the wards and out-patient departments of our hospitals also become universal instead of limited to a few of the leaders. As the century progresses may the public and profession more clearly realize that specialism is primarily for complicated treatment and for assistance in diagnosis by means of special technique. It must also be generally realized that surgery is specialism. Finally the success in making available the best of medical service to the public will depend upon building up private and office practice about the family medical adviser and hospital practice about the diagnostic service.

THE ROLE OF ALLERGY IN ARTHRITIS*

BY FRANCIS M. RACKEMANN, M.D.†

ARTHRITIS has many forms. The joints of scurvy, purpura and hemophilia with hemorrhages into the joint cavity have an obvious local cause. Many acute infectious diseases have arthritis as a complication. Sometimes, as in pneumonia, it is due to the lodgment of septic emboli and pus develops. Usually, the joint fluid is clear and the cultures sterile; the joints are of "toxic" origin. The arthritis which occurs in about 14 per cent of the cases of serum sickness is also toxic. Its exact pathology is unknown, but von Pirquet and Schick[1] believe that the acute pain in the joints of serum sickness is due to an edema of the synovial membrane quite comparable to the urticarial eruption on the skin. The cause of the edema is a poison which results from the interaction between the diminishing amounts of horse serum and the increasing amounts of antibody.

The joints of rheumatic fever are not only painful but they are red and swollen, somewhat like the acute septic joints mentioned above. The evidence of a blood stream infection in acute rheumatic fever is conflicting, due, as Cecil[2] has demonstrated, to the variations and difficulties in the technic of the blood cultures. The results of blood cultures, however, show the finding of streptococci of the alpha (viridans) type in a not inconsiderable proportion of the cases. Cecil's review of the literature shows that whereas many authors differ in their reports of the proportion of patients with rheumatic fever in whom positive blood cultures were obtained, the various organisms found in most of the cases belonged to the group of methemoglobin-producing ("green") streptococci of the alpha "viridans" type. Furthermore, the production of joint lesions in rabbits by injecting the organisms intravenously was successful in several instances.

In some contrast to the finding of green producing streptococci, Coburn and Pauli[3] have recently called attention to the close relationship of the hemolytic streptococcus to rheumatic fever saying that throat infections were a regular precursor of the disease; that the particular streptococci belonged to a fairly uniform group; and that antibodies to these streptococci appeared at the time of the attack. It is evident that the nature of the disease and the results of cultures suggest a bacterial cause but the identity of the specific organism is still very uncertain.

Arthritis proper, including the chronic affections of the joints which cannot be proved to have a specific etiology, includes two broad types. One is the condition common in older people which is known as *Hypertrophic* or *Osteoarthritis.* The fingers often show Heberden's nodes on the terminal phalanges and the symptoms depend upon a hypertrophy — an overgrowth—of the bones surrounding the joints and a degeneration of the articular cartilage which together result in deformities of many kinds. The cause of this condition is obscure, but for the moment it is safe to regard it as a non-infectious degenerative process due to the wear and tear of life and concerned perhaps in part with changes in the local blood supply. Keefer[4] has recently demonstrated the high incidence of lesions found at autopsy in the knee joints of older people who died from various causes. The location and nature of these lesions suggest strongly that they are of mechanical origin due to the long-continued trauma of weight bearing.

The second type and the one most important to this discussion is *Atrophic* or *Rheumatoid Arthritis,* a slow sluggish disease of young and middle-aged adults, chiefly women, who are found to be in rather poor general condition and are commonly of the slender ptotic type. The joints, usually only one or two at first, show swelling of the soft parts around them, together with pain and stiffness. The principal lesion consists in a small round cell infiltration with marked thickening and proliferation of the synovial membrane which goes on to form adhesions within the joint. This proliferation is accompanied by atrophy and erosion of the cartilage and atrophy of the bony trabeculae, and after a long painful course, leads ultimately to ankylosis.

The hypothesis that, like rheumatic fever, this other and more chronic process is also due to the action or effect of bacteria, has long been entertained, and the brilliant results which occasionally follow the removal of a focus of infection in teeth, tonsils, or sinuses have encouraged the thought. The fact is, however, that cultures of the blood, synovial fluid, and regional lymph nodes have been studied with results which are even more confusing than in the case of rheumatic fever. For example, in 1912 Davis[5] cultured the blood and synovial fluid in 14 cases with negative results. In 1914 Rosenow[6] claimed to find streptococcus viridans in 32 out of 54 regional lymph nodes and various other organisms in all the other cases, only seven being sterile. In 1926, Billings, Coleman and Hibbs[7] cultured the joint tissue in 14 cases,

*From the Anaphylaxis Clinic and Medical Laboratory, Massachusetts General Hospital.
Read before the Society for the Study of Arthritis, December 2, 1932.

†Rackemann — Physician, Massachusetts General Hospital. For record and address of author see "This Week's Issue," page 1384.

finding streptococcus viridans in five, streptococcus hemolyticus in one, and a mixture of organisms in one. In 1927, Hadjopoulos and Burbank[8] cultured the blood in 145 cases, finding hemolytic streptococci in nine, viridans in six, diphtheroids in eight, and staphylococci in five. Finally, in 1929, Cecil, Nicholls, and Stainsby[9] with a special technic found streptococci in the blood of 48 of their 78 patients (61%). The cultures made on 54 control subjects were negative. Eighty-three per cent of their cultures were "attenuated hemolytic streptococci"—the organism seemed to belong to a fairly uniform group. When rabbits were treated with seven of these organisms the serum from each of the seven rabbits was able to agglutinate 37 of the 43 "typical strains". In a later paper, the same authors[10] report a series of 154 cases with streptococci in the blood cultures of 96 (62.3%) and in the joint cultures of 33 out of 49 cases (67.3%). Cecil has also found that the serum of his patients with rheumatoid arthritis would agglutinate the organism, and more recently Boots[11] reports that in a "blindfold" test Dr. Cecil applied his agglutination test to the blood of 18 patients with atrophic rheumatoid arthritis and 18 controls, and was able to distinguish between the two groups in all but two cases.

The report of this work has stimulated many efforts to confirm it. While streptococci have been found, the percentage of positive cultures has been much lower than in Cecil's series. Forkner, Shands, and Poston[12] made cultures of the joint fluids of 63 patients with chronic arthritis and found streptococci in 14 (22%). In cultures of the lymph nodes, the same investigators found that ten out of 21 or 48% were positive. Wetherby and Clawson[13] made blood cultures in 57 cases and found streptococci in 25 whereas at the same time cultures from 50 normal non-arthritis persons were negative except in one case in which streptococci were found in the blood of a woman who had pelvic inflammation. As opposed to these more favorable reports, Margolis and Dorsey[14] made 162 blood cultures in 89 patients with chronic infectious arthritis but found streptococci in only nine instances. Neither Nye and Waxelbaum[15] nor Dawson, Olmstead and Boots[16] found streptococci in more than one or two cases, although the precise technic prescribed by Cecil was followed with every care. The latter authors encountered streptococcus viridans occasionally in similar cultures on normal individuals, perhaps, as they pointed out, because the special technic requires at least 14 different manipulations of the test material. More recently, Lichtman and Gross[17] have shown that alpha and gamma streptococci were found in approximately six per cent of over 5,000 consecutive blood cultures taken in a variety of clinical conditions at Mount Sinai Hospital.

As for the agglutination, Dawson, Olmstead and Boots[18] agree that the reactions were present, but unfortunately other hemolytic streptococci from many different sources including scarlet fever, erysipelas and rheumatic fever were also agglutinated by rheumatoid arthritis serum. Strains of pneumococci were likewise agglutinated. The authors recall the Weil-Felix reaction in typhus fever and explain that in that disease the agglutination of the x 19 strain of proteus bacillus is found with regularity. They maintain, however, that this finding cannot be considered as valid evidence of a causal relationship between that bacterium and the disease in question. In the present study, they can only say that the agglutination of the streptococcus is highly characteristic both for the disease rheumatoid arthritis and the bacterial species streptococcus hemolyticus. The finding is important because it provides tangible evidence that rheumatoid arthritis is a generalized disease with other features besides the joints.

"Allergy" in its common clinical use refers to the results of reactions which (1) are immediate in their occurrence; (2) are produced by a great variety of substances having widely different chemical structures and which (3) occur in individuals who have been sensitized by former contact so that their reaction to the substance is very different from the reaction of a normal individual. The reaction in clinical allergy is of the immediate urticarial type. The skin test to ragweed, horse dander, or egg-white is the typical illustration. Such a reaction is mediated by circulating antibodies. Studies on serum disease show that the skin test to horse serum cannot be demonstrated until antibodies like precipitins and anaphylactic antibodies for horse serum have appeared in the circulation. More recently, Tillett and Francis[19] have shown that the immediate urticarial skin test elicited with the carbohydrate substance of the pneumococcus does not appear in pneumonia patients until after the crisis, that is to say, until after agglutinins have appeared in the blood. Although similar antibodies have not been found so far in our patients with asthma and hay fever, there is some reason to think that the demonstration is largely a matter of technic.

Asthma, hay fever, eczema and urticaria are the clinical expressions of the immediate reactions which result when the sensitive patient comes into contact with the specific substance. The variations in the symptoms are explained by the assumption that one organ or tissue is more "sensitive" than another. Whether arthritis can be inserted in this same category is very doubtful. While many patients with hay fever have asthma and others with eczema have asthma, it is not common to have arthritis

included with the other complaint. For some years I have asked all new patients with asthma or hay fever the routine question: "Do you have rheumatism?" The answer is almost invariably "No".

Bray[20] in London writes, "At the Hospital for Sick Children, amongst 800 children attending the Asthma Clinic and a similar number attending the Rheumatic Clinic, there is not one child with distinct evidences of both diatheses." W. T. Vaughan[21] with a special interest in asthma and hay fever but writing on bacterial allergy and chronic arthritis does not mention the relation of arthritis to asthma. Harkavy[22], however, found nine patients among 400 with asthma who also had arthritis. In seven of the nine, both the arthritis and the asthma cleared when foci of infection were eliminated. Evidently the relation of arthritis to this particular form of allergy is very doubtful.

But the word "allergy" is also used in connection with other reactions which are not immediate but delayed; which give rise not to urticarial wheals, but to areas of inflammation. So far, most delayed reactions have been produced by bacterial products. The reactions to tuberculin, mallein, and to suspensions of killed organisms in great variety are familiar. They are called "allergic" because persons who are "normal" do not respond to the tests which appear only in case the individual has had previous contact with the same substance, presumably through bacterial infection. This delayed, tuberculin-type reaction is not mediated by antibodies in the ordinary sense. It depends entirely upon a tissue reaction. It develops in those cases in which the preliminary sensitizing treatment has caused a local inflammatory process Consequently, reactions of this type are more important in bacterial allergy than in ordinary protein anaphylaxis.

"No tuberculin reaction without a tubercle" was Krause's[23] original dictum and so it is that whenever animals are actively infected, they develop the power of reacting with a local inflammatory response appearing in twenty-four hours, whenever their skin is tested with the same bacterium or its products, and such a skin sensitiveness will persist indefinitely—perhaps for years—as will be discussed again.

Modifications of this general result occur in accordance with variations in the technic of preliminary treatment and of the test which follows later. In 1921, Zinsser[24] demonstrated that true tuberculin sensitiveness was produced most easily when the animals were actively infected but that treatment with the protein fraction of the bacteria was sometimes successful.

With streptococci, the results are not so regular. Zinsser and Grinnell[25] had some success with nucleo-protein and "Dick" filtrates. The method of injecting warm infected agar to make subcutaneous foci as described originally by Dochez[26] (in connection with the production of anti-scarlatinal serum) gave better results, but for streptococci the most regular and potent method was by the injection of whole living bacteria intraperitoneally.

The route by which the sensitizing doses are given is important. In 1928, Swift, Derick and Hitchcock[27] showed that when the doses of streptococcus viridans were injected intracutaneously, a reactivity of the delayed, inflammatory type was produced. The animals became "allergic" or "hyperergic". When, however, the doses were given intravenously, the animals did not respond at all to skin tests. They were immune or "anergic". For the study of allergy in rabbits, Swift found that the best results came when his animals were prepared by infected agar foci.

These different studies point to one important hypothesis. Whenever a reaction of the delayed inflammatory tuberculin type is produced, the animal has been treated with materials which give rise to a definite local inflammatory lesion. Sensitization of this type will not result when the doses are given intravenously. The importance of focal infections becomes obvious.

But what is the relation between the two types of reaction and what is their significance? In most of the literature on bacterial allergy, the immediate reactions have been referred to as "anaphylactic" while the late inflammatory reactions have been called "allergic". Between the two is a distinct pathological difference, but so far the significance of this difference from the immunological point of view is not well understood. There is evidence that the two reactions represent two phases of the immune process.

The recent observations of Dienes[28] are very interesting. When a guinea pig is sensitized to egg white, and then after an interval of about two weeks is tested by injecting egg white intracutaneously, the reaction will appear in a few minutes and will be urticarial in type. If, however, this sensitized pig is tested in a shorter time, that is, in from three to five days after treatment, the reaction will consist of a slight red area which develops in about twenty-four hours after the test injection. It is a mild reaction of the tuberculin type. The normal animal shows no reaction at all. When a rabbit is used, the reaction to skin test as shown by Knox, Moss, and Brown[29] is a necrosis which appears in twenty-four hours. Here too Dienes has observed that the necrotic reaction has an early phase which in the first hour consists of an edema with central hemorrhage quite similar to the reaction in the strongly sensitized guinea pigs. Finally, a third observation is most important.

Using egg white alone, Dienes[30] has been able to sensitize a guinea pig by a special technic so that when tested later the animal will respond with a delayed reaction of the necrotic type. By injecting egg white into a tuberculous lesion in a testicle or a lymph node of a tuberculous animal, this special preparation made the animal react later to egg white with a delayed inflammatory response.

These three observations indicate that the immediate reactions called anaphylactic and the delayed reactions called allergic which appear so separate and distinct are merely two phases of the same process. Both reactions may be demonstrated when an animal is treated with any one of a variety of agents. Ordinarily, however, one type of reaction predominates over the other and the determination of this type rests entirely upon the presence or absence of a tissue reaction caused by the preliminary treatment. The rôle of the pathologic lesion in the development of the tuberculin type of sensitiveness is very important. Dienes' success in producing a delayed reaction to egg white by using the inflammatory process is strong confirmatory evidence of the whole conception.

From these experiments, it is proper to conclude that sensitiveness appears to occur in two phases. The delayed inflammatory reaction appears early within a few days. It depends upon the original tissue disturbance. The immediate anaphylactic reaction comes later in the process when circulating antibodies have had time to develop. Since both reactions tend to persist in the form of skin tests, they can often be demonstrated at the same time in accordance with the test materials used. Whole vaccines, broth culture filtrates (toxins), and extracts containing protein, all produce reactions of the delayed inflammatory type when injected subcutaneously into sensitized animals. On the other hand, the carbohydrate fraction will call forth a response which appears immediately and is of the urticarial type.

In man, skin tests with bacteria and the products of their growth are easily obtained, and many adults will respond in some degree to a wide variety of organisms. The results, however, rarely have great clinical value. Derick and Fulton[31] made intracutaneous tests with the nucleo-proteins of hemolytic streptococcus and green streptococcus on 670 patients with a great variety of diseases at the Peter Bent Brigham Hospital. Fifty-two per cent were positive to the hemolytic streptococcus nucleo-protein and 21 per cent to the green streptococcus.

These findings are to be explained by the persistence of sensitiveness after infections. Skin tests to bacteria represent merely a record of past experiences and may or may not be concerned with the present illness. Mackenzie and Hanger[32] suggested that positive skin tests to bacteria are a function of the patient's age. On the other hand, the degree of sensitiveness tends slowly to recede, and consequently the degree of the response is of some importance. Swift[27] found that when the agar foci were removed from his rabbits, the response to skin tests diminished. Late inflammatory reactions following skin tests have their counterpart in the inflammatory reactions in joints.

There are several reasons for invoking the conception of allergy as a means of explaining the symptoms of rheumatic fever and also the symptoms in chronic atrophic or rheumatoid arthritis. The idea was first introduced by Herry[33] in 1915. Both Zinsser and Grinnell[28] and Swift, Derick and Hitchcock[27] have laid stress on the theory as a means of explaining many of the findings in rheumatic fever as well as in chronic atrophic rheumatoid arthritis. Two of these findings are particularly characteristic. The first is the coincidence that in subacute bacterial endocarditis with the blood stream full of streptococci, no joint symptoms occur; whereas in rheumatic fever cultures of streptococci from the blood are obtained with difficulty and yet many joints are involved. Evidently, something beside the bacteria themselves is necessary to induce rheumatism. On the other hand, joint lesions in experimental animals can be produced only by injecting streptococci intravenously. No one has produced lesions in the joints by the intravenous injection of sterile materials. Zinsser and Grinnell[34] could produce inflamed joints in allergic animals by injecting pneumococcus autolysates but these injections were given directly into the joints.

The second finding is that the clinical picture of chronic rheumatoid arthritis is uniform in spite of the fact that the organisms identified from blood cultures have varied so widely. Poynton and Paine[35], E. C. Rosenow[36], Clawson[37], Small[38], and Cecil[9] have each found streptococci, but the organisms are different both in their effect upon different sugars and in their failure to cause cross agglutination. Cecil's findings which are of particular interest, have been discussed above.

The problem of the mechanism involved in arthritis is evidently closely related to the problem of the mechanism in asthma. In both conditions the fundamental feature is not the particular agent but the reaction of the host toward this agent. It is the host factor which is important—von Pirquet[39] used the word "Reaktionsfähigkeit" to describe allergy. In asthma and hay fever, the symptoms depend typically upon reactions of the immediate type. They are always the same regardless of the particular exciting cause—the trigger mechanism. Just how these reactions cause symptoms is unknown. Interesting is the suggestion of Sir Thomas Lewis[40] that the union of antigen with antibody

which takes place on the surface of the cell gives rise to an injury of the cell sufficient to make it release the histamine-like substance which it normally contains. This explanation is satisfactory except that in most of the cases the degree of sensitiveness is so exquisite that the amount of antigen available to produce symptoms is infinitesimal. That such a minute quantity could be still further subdivided and yet still be sufficient to affect any considerable number of cells at the same time is hard to believe.

In arthritis the situation is quite analogous except that the fundamental reaction is of the delayed inflammatory type. Symptoms result from the action of different bacteria in remote foci (Zinsser and Yu[41] found organisms even in the heart muscle and in the spleen) and these symptoms are essentially the same despite the variations in cultural results. No doubt allergy plays a part but the mechanism of this part is not at all clear.

Just as asthma and hay fever depend upon "clinical allergy"—upon the capacity of the individual to develop sensitiveness and then to react to the specific substance—so the symptoms of arthritis must depend upon some fundamental background which makes the victims react in an unusual manner to the products of bacteria and their growth. The study of clinical allergy involves the study of immediate reactions. Rheumatoid arthritis appears to be a characteristic manifestation of those conditions which depend upon the delayed inflammatory tuberculin type of reaction. The study of both these reactions involves the background on which they develop. The two clinical conditions are different but certain analogies between them are interesting. Advances in our knowledge of the one will lead directly to advances in our knowledge of the other. Students of the immediate reaction which results in asthma or hay fever or eczema should watch the studies of the late reaction which results in arthritis just as the students of arthritis should watch asthma.

REFERENCES

1 von Pirquet and Schick: Die Serumkrankheit. Vienna, Deuticke, 1905.

2 Cecil, R. L.; Nicholls, E. E., and Stainsby, W. J.: Bacteriology of the blood and joints in rheumatic fever. J. Exper. Med. 50: 617 (Nov.) 1929.

3 Coburn, Alvin F., and Pauli, Ruth H.: Studies on the relationship of streptococcus hemolyticus to the rheumatic process. J. Exper. Med. 56: 609, 1932.

4 Keefer, Chester S.: The classification and certain pathological aspects of chronic arthritis. New Eng. J. Med. 208: 1027 (May 18) 1933.

5 Davis: Quoted by Cecil.

6 Rosenow: Quoted by Cecil.

7 Billings, Coleman and Hibbs: Quoted by Cecil.

8 Hadjopoulos and Burbank: Quoted by Cecil.

9 Cecil, R. L.; Nicholls, E. E., and Stainsby, W. J.: The bacteriology of the blood and joints in chronic infectious arthritis. Arch. Int. Med. 43: 571, 1929.

10 Cecil, R. L.; Nicholls, E. E., and Stainsby, W. J.: The etiology of rheumatoid arthritis. Am. J. M. Sc. 181: 12, 1931.

11 Dawson, M. H., and Boots, R. H.: Recent studies in rheumatoid (chronic infectious, atrophic) arthritis. New Eng. J. Med. 208: 1030 (May 18) 1933.

12 Forkner, Claude E.; Shands, A. R., and Poston, M. A.: Synovial fluid in chronic arthritis. Bacteriology and cytology. Arch. Int. Med. 42: 675, 1928.

13 Wetherby, M., and Clawson, B. J.: Chronic arthritis with special reference to intravenous vaccine therapy. Arch. Int. Med. 49: 303 (Feb.) 1932.

14 Margolis, H. M., and Dorsey, A. H. E.: Bacteriology of blood in chronic infectious arthritis. J. Infect. Dis. 46: 442, 1930.
Chronic arthritis. Bacteriology of affected tissues. Arch. Int. Med. 46: 121, 1930.

15 Nye, R. N., and Waxelbaum, E. A.: Streptococci in infectious (atrophic) arthritis and rheumatic fever. J. Exper Med. 52: 885 (Dec.) 1930.

16 Dawson, M. H.; Olmstead, M., and Boots, R. H.: Bacteriologic investigations on the blood, synovial fluid, and subcutaneous nodules in rheumatoid (chronic infectious) arthritis. Arch. Int. Med. 49: 173 (Feb.) 1932.

17 Lichtman, S. S., and Gross, L.: Streptococci in the blood in rheumatic fever. Rheumatoid arthritis and other diseases. Arch. Int. Med. 49: 1078, 1932.

18 Dawson, M. H.; Olmstead, M., and Boots, R. H.: Agglutination reactions in rheumatoid arthritis. I. Agglutination reactions with hemolytic streptococci. II. The nature and significance of agglutination reactions with streptococcus hemolyticus. J. Immunol. 23: 187, 1932.

19 Tillett, W. S., and Francis, T., Jr.: Cutaneous reactions to the polysaccharides and proteins of pneumococcus in lobar pneumonia. J. Exper. Med. 50: 687 (Nov.) 1929.
Francis, T., Jr., and Tillett, W. S.: Cutaneous reactions in pneumonia. The development of antibodies following the intradermal injection of type-specific polysaccharides. J. Exper. Med. 52: 573, 1930.

20 Bray, George W.: Recent Advances in Allergy. London, J. & A. Churchill, 1931.

21 Vaughan, W. T.: Bacterial allergy and chronic arthritis. Virginia M. Monthly. 59: 7 (Apr.) 1932.

22 Harkavy, J., and Hebald, S.: Association of infectious asthma and arthritis from the point of view of bacterial allergy. Arch. Int. Med. 49: 698, 1932.

23 Krause, A. K.: Studies in immunity to tuberculosis. Experimental studies on the cutaneous reaction to tuberculoprotein. J. M. Research. 35: 1 (Sept.) 1916.

24 Zinsser, H.: Studies on the tuberculin reaction and on specific hypersensitiveness in bacterial infections. J. Exper. Med. 34: 495 (Nov.) 1921.

25 Zinsser, H., and Grinnell, F. B.: Further studies on bacterial allergy. Allergic reactions to the hemolytic streptococcus. J. Immunol. 10: 725, 1925.

26 Stevens, F. A., and Dochez, A. R.: The study of hemolytic streptococci associated with scarlet fever. Proc. Soc. Exper. Biol. & Med. 21: 39, 1923-1924.

27 Swift, H. F.; Derick, C. L., and Hitchcock, C. H.: Rheumatic fever as a manifestation of hypersensitiveness (allergy or hyperergy) to streptococci. Tr. A. Am. Phys. 43: 192, 1928.

28 Dienes, L.: Further observations concerning the sensitization of tuberculosis guinea pigs. J. Immunol. 15: 153, 1928.

29 Knox, J. H. M.; Moss, W. L., and Brown, G. L.: Subcutaneous reaction of rabbits to horse serum. J. Exper. Med. 12: 562, 1910.

30 Dienes, L.: Comparative study of the anaphylactic and tuberculin types of hypersensitiveness. II. The influence exerted by the nature of the antigen on the development of the different types of hypersensitiveness. J. Immunol. 20: 333, 1931.
Factors conditioning the development of the tuberculin type of hypersensitivity. J. Immunol. 23: 11 (July) 1932.

31 Derick, C. L., and Fulton, M. N.: Skin reactions of patients and normal individuals to protein extracts of streptococci. J. Clin. Investigation. 10: 121, 1931.

32 Mackenzie, G. M., and Hanger, F. M., Jr.: Allergic reactions to streptococcus antigens. J. Immunol. 13: 41, 1927.

33 Herry: Quoted by Zinsser, Hans: Resistance to Infectious Diseases. New York, The Macmillan Co., 1931, p. 466.

34 Zinsser, H., and Grinnell, F. B.: Further studies in bacterial allergy. Antigen involved in pneumococcus allergy. J. Bact. 14: 301 (Nov.) 1927.

35 Poynton, F. J., and Paine, A.: The etiology of rheumatic fever. Lancet. 2: 861, 1900.

36 Rosenow, E. C.: The etiology of articular and muscular rheumatism. J. A. M. A. 60: 1223 (Apr. 19) 1913.
The etiology of acute rheumatism, articular and muscular. J. Infect. Dis. 14: 61, 1914.

37 Clawson, B. J.: Studies on the etiology of acute rheumatic fever. J. Infect. Dis. 36: 444 (May) 1925.

38 Small, J. C.: The bacterium causing rheumatic fever and a preliminary account of the therapeutic action of its specific antiserum. Am. J. M. Sc. 173: 101, 1927.

39 v. Pirquet, C.: Allergie. München. med. Wchnschr. 53[2]: 1457 (July 24) 1906.

40 Lewis, Sir Thomas: The Blood Vessels of the Human Skin and Their Responses. London, Shaw & Sons, Ltd., 1927.

41 Zinsser, H., and Yu, H.: The bacteriology of rheumatic fever and the allergic hypothesis. Arch. Int. Med. 42: 301, 1928.

OUR LATER HERITAGE*

BY H. QUIMBY GALLUPE, M.D.†

ON the ocean, wave follows wave; it is not the same wave, yet one causes another and transmits its form and movement. So, the beings traveling through the world are not the same today and tomorrow, nor in one life the same as in another; and yet it is the urge and the form of the previous lives that determine the character of those that follow.

Six years ago, the orator of that day told us of Dr. Philip Shattuck, whose death in 1722 was the occasion for the selectmen of Watertown to order "one pair of gloves for the Rev. Williams, four pairs for the bearers, and also cider for the people who attended the funeral". Of Dr. Robey, that intrepid supporter of Dr. Boylston in his fight against the smallpox. Of Dr. Marshall Spring of Watertown, whose prescription for indigestion was to "drink the hundredth stroke of the pump before each meal". Of Dr. Benjamin Waterhouse, who introduced vaccination into the Western world. Of Dr. Horatio Adams, who inoculated his own cows in his barn at the corner of Lyman and Summer Streets in Waltham. Of Dr. Luther Bell, the psychiatrist, who fought spiritualism and said, "that the mediums never told what the inquirer did not know before".

Dr. Dwight O'Hara ended his oration of 1927 with these lines: "It would be presumptuous in me to speak of the works of such men as Drs. Hosmer, Cutler, Wyman, Fernald, Walcott, Worcester, and Stevens. The mere mention of their names, however, reminds us of the fact that Middlesex South has continued, and is continuing, to contribute her large share to the progress of our profession. Indeed, I have but set the stage for another orator and another year."

The orator and the year have arrived. I am convinced that a look into the medical history of the nineteenth century in Middlesex may be profitable, and that we may find there the actions and words to guide us through our present, and perhaps our future, difficulties. I wonder how cheerful we would be, if, in addition to the bank holiday, the scarcity of money and patients, the much discussed and very real "high cost of medical care", state medicine, public health activities, medical legislation, the cults, free clinics, all the complicating fads and fancies of medical practice, we had to fight typhoid fever without vaccine, diphtheria without anti-toxin, fractures without x-ray, cancer without radium and operating facilities, inflammation without asepsis, and poor roads without motor cars. I venture to say that the fear of an overproduction of doctors would be banished, and that we would have great difficulty in finding sufficient men of courage and stamina to withstand the trials such conditions would produce.

And yet, in the last century, Middlesex South must have had such physicians; men who visited the wards of their hospitals to find in the first bed a typhoid, in the next a hopeless cancer of the breast, in another, a compound fracture dripping foul pus, and in the contagious wards, literally scores of patients of all ages with diphtheria, a large percentage of whom were doomed to die, and who could then leave for the homes of their patients filled with good cheer and optimism. And they went out to fight for public health legislation, for the better health of the school children, for the education of nurses, and for the funds with which to carry on their new hospitals. Those men believe, as one of their number once said: "There can never come a time in the advance of a republic when any profession can be released from the obligation of public service. Most especially is this true of our profession."

Today those men seem heroic figures in our history.

Until 1880 the medical men of our county were playing a lone game; busy the whole day and far into the night with their practices; delivering babies in the homes; operating in kitchens; caring for infectious diseases with little, if any, isolation; and sending most of their surgical patients to the Massachusetts General Hospital. There were no trained nurses, and no public agencies for the care of the sick. There was no shirking of responsibility, for they had the entire care of all the people.

Four factors influenced the establishment of hospitals in Middlesex as well as in other suburban districts throughout the country: namely, the return of surgeons of the Civil War to private practice, the work of Pasteur and Lister, the need for nurses, and the advance in surgery due to the discovery of antisepsis and to the new science of bacteriology. Of these, the need for trained nurses was the most important factor in the growth of hospitals during the latter part of the century. Surgeons saw the need for suitable places in which to operate, and nurses became essential to the work of the hospital.

In 1894, in a little book called, "Small Hospitals", Dr. Alfred Worcester wrote: "Trained nurses can now be had in nearly every community; and yet there were none in this country at the out-break of the Civil War. Nor

*Annual Oration presented at the Annual Meeting of the Middlesex South District Medical Society, April 20, 1933.

†Gallupe—Visiting Surgeon to Waltham Hospital. For record and address of author see "This Week's Issue," page 1384.

were there any really trained nurses for some years after this war. Dreadful as was the nursing in private homes; it was simply atrocious in hospitals. In Bellevue Hospital in New York, for instance, the nursing was formerly entrusted to women who in the police courts chose a term of service as hospital nurses when the alternative of a term in prison was given them. No wonder that these nurses would occasionally be found drunk by the death beds of their neglected patients, whose stimulants they had stolen."

By 1880 there were sufficient nurses who had been trained in the large hospitals of the cities to take charge of the smaller suburban hospitals as matrons and directors of the training schools. In Waltham, the nursing school antedated the hospital because the doctors there sensed the need for nurses in the homes, and they insisted that the nurse could be trained best in the home by the doctor, and that the education of the nurse depended on the physician and not upon the hospital.

The decade which began in 1880 was productive of the major hospitals in Middlesex South. The need for them was certain, but it cannot be said that they became popular at once. Most of us were born in that decade, but it is hardly possible that most of us were born in our hospitals.

The pioneer in hospital work in Cambridge was Miss Emily Parsons, a Civil War nurse, who opened a cottage hospital for women and children in 1867. It remained in operation but a year when it closed for lack of funds. It was re-opened in 1869, and was incorporated in 1871 as the Cambridge Hospital, thereby winning distinction as the fifth hospital in the State. However, its doors were closed again in 1872 for lack of money and interest. Emily Parsons died in 1880 with the wish that her hospital work would eventually succeed. In 1881, after a respite of nine years, the real need for a hospital in Cambridge was apparent. The population had increased by 20,000, and more than 100 patients were going to the Massachusetts General Hospital every year.

On December 3, 1881 Miss Parsons' wish came true when the first sod was turned for the new Cambridge Hospital on the spot where Sir Richard Saltonstall landed on his journey up the Charles from Salem with Governor Winthrop in 1630. On April 29, 1886, the hospital was dedicated and Dr. Morrill Wyman was the speaker. He told them of the very beginnings of medical practice in Cambridge; how the churches cared for their communicants until 1663, when the town took over the work and built a workhouse and almshouse in 1779, which burned down along with some of its "wretched inmates" in 1836. Another took its place on the present site of the Riverside Press. It is no wonder that the attempts of the Civil War nurse were met with financial disaster when Dr. Wyman tells us that "Sister Banbrick had a breast of mutton," he referred to the ladies' worldly goods which were offered in exchange for medical attention and not to any physical defect she may have presented to her examining physician. Dr. Wyman closed his remarks by saying: "May those of coming generations who find relief here bless this work of our hands after we have passed away, and when even our very names may have been forgotten."

Surely, the name of Dr. Morrill Wyman cannot be forgotten easily for we remember what Dr. Francis G. Peabody said of him at the dedicatory exercises of the new Wyman House in October, 1929: "Dr. Wyman, the wise and beneficent physician driving about Cambridge in his old buggy and smiling to his neighbors as he went. He was not only the most esteemed of the physicians in Massachusetts, but he was the gentlest and most generous of friends."

Born in 1818, he was able to watch the development of medicine and nursing, and the birth of hospitals in his own town, city, and state throughout almost the entire nineteenth century. When still a young man he became vitally interested in things pertaining to the organization of the state society, and he kept that interest until 1902, when he attended his last council meeting where he introduced a motion to have made an index of the Medical Comments of the Society which had been published since 1790. In 1849 he served on the first committee of arrangements. In his Annual Discourse at the meeting of the Society in Pittsfield at the Berkshire Medical College in 1863, he gave "thanks for the pure air and the unsurpassed mountain scenery of that delightful region." In 1868, he was one of a committee to request the Governor and his Council to appoint a medical man as coroner in the different districts of the State wherever possible. He served for eighteen years as President of the Trustees of the hospital which he was foremost in founding.

Surely, the two outstanding physicians of our district a half century ago were Morrill Wyman and Alfred Hosmer of Watertown. Our oldest Fellows remember them almost as dictators, or at any rate as strenuous opponents of revolutionary changes then beginning in the practice of medicine. For example, both of them opposed the establishment of training schools for nurses. In fact, only in his last illness did Dr. Wyman fully surrender to modern nursing. "What have you come here for?" he asked the young graduate nurse who replaced those whom he had been bossing. "To take care of you, sir," was her quiet answer. The old man thenceforth was lamb-like and shortly before he died he sent word to the school she came from that he had become converted to trained nursing.

Perhaps the chief characteristic of Morrill Wyman was his indomitable energy in fighting for the lives of his patients. For example, one early morning at Bar Harbor, he met a celebrated obstetrician returning from a summer home ten miles away, where, as Dr. Wyman knew, one of his Cambridge patients had been prematurely delivered the day before. "How is she?" he asked. "Dying", was the answer of the obstetrician, who an hour earlier had left her in uremic coma, telling the husband that nothing more could be done. Dr. Wyman ran to a nearby mansion and begged the strangers there for a team. It was before the old man's breakfast and yet only with difficulty could they make him swallow his coffee while waiting for the horses. An hour later these horses, lathered white, dashed up the avenue and the old doctor rushed into the sick room. "Is she living?" "Yes, barely," was the husband's reply. "What are you doing for her?" "Nothing." "Well, get busy here, all of you," said Dr. Wyman as, stripping off his coat and vest, he rolled up his sleeves and went to work. He called for blankets to be wrung out of scalding water, meanwhile keeping all hands rubbing warmth into the cold body. After several hours the patient came out of her coma. She completely recovered and the old doctor made his excuses to the obstetrician for having interfered.

Dr. Alfred Hosmer, born in 1832, became the pupil of his uncle, Dr. Hiram Hosmer of Watertown. He was graduated from Harvard College, the Medical School, and the Massachusetts General Hospital. In 1857 he began his practice in Watertown where he became one of the town's most influential citizens. Like Morrill Wyman, he was always active in the affairs of the State Society where he was a member of the Council, anniversary chairman in 1877, and the youngest president in 1882. He led the fight against taking women into the Society on an equal footing with men, but a minority report of the committee, of which he was a member, was accepted, and in 1882 women were finally taken for examination. Since then the subject has not been revived and Dr. Burrage in his history of the Society marvels "that there could be so much and so long-sustained opposition to what today we regard as the obvious".

Dr. Francis Webster Goss, who was secretary of the State Society for 34 years, during which time he attended the 102 meetings of the Council, and the 38 meetings of the Society, says of Dr. Hosmer: "Dr. Alfred Hosmer was an energetic and efficient president. He gave great attention to the district societies and saw to it that they performed their duties in accordance with the by-laws. His memory is revered by me."

Dr. Edwin Howard Brigham, librarian of the State Society for 37 years, and who "knew every man who came to the meetings in Boylston Place by the back of his head so that he might call him out if he were needed by a patient, and who cremated, after the meetings, the piles of tumors and pathological specimens heaped by the officer's desk for demonstration," says of him, "Alfred Hosmer was a good man, but somewhat reserved and with very strong opinions which he expressed rather freely. I knew him pretty well from boyhood, as I lived in Watertown and he attended professionally all my family. He was very active in town meetings and very insistent that his ideas prevail."

Dr. Hosmer might be called an aggressive conservative. His contempt for the new specialty of gynecology was simply sublime. He begged young practitioners never to uncover the genitalia of even an etherized female patient. "But how about obstetrical operations?" he was asked. "Never, never," he answered. "But what if repairs are necessary?" "Never in all my practice has such a necessity occurred," was his answer, which made his questioner less surprised afterwards in finding in one of Dr. Hosmer's patients a cloaca maxima instead of a perineum.

One of Dr. Hosmer's strong points was his insistence upon professional ethics. Once when called to a rich old man who complained that "neither Dr. Wyman nor that other old fool, Dr. Hodgdon, had done him any good," Dr. Hosmer told him that what he needed was a physician he would be willing to die under; "and it will not be me, either," he said as he turned on his heel. Now, as it happened he was barely on speaking terms with Wyman and Hodgdon of Arlington, his two chief rivals, but when the rich man's family came begging Dr. Hosmer to relent, "No," he said, "— him, I'll teach him to respect the medical profession."

His was a busy practice which covered a very large territory. He managed to keep up with it by the use of six horses, and a rest in the middle of the day. Just before office hours, he would go up to his room, fling himself across his bed and pick up a book. When the book fell from his hands, he got up and went down to see his patients. At the age of 47, his daughter's favorite horse, Maud, brought him home through the streets of the town and up into the horse shed, slumped down in front of the seat stricken with a paralysis from which he failed to recover. He died in 1891 at too young an age for such an able and distinguished physician.

In the membership of our Society fifty years ago there were no specialists. All were general practitioners. While, here and there, someone was generally considered especially good as a surgeon, or obstetrician, or diagnostician, the

most famous all-round doctor would answer any call and balk at nothing. Morrill Wyman is known to have done a strangulated hernia for a woman 80 years old on her kitchen table. The fact that she lived to be 95 testifies to his ability. Many of these men had served as surgeons in the Civil War. Several of them had seen more or less service in European hospitals. The amount of work they did, and the variety of it, was prodigious.

Of this class, fortunately, we still have with us one notable survivor, our honored and beloved Fellow, Edmund Stevens, a pupil of Morrill Wyman's. Dr. Stevens was the surgical head of the Cambridge Hospitial for 25 years. He performed the first operation for appendicitis done at that hospital; he did the first cholecystectomy in this region. Like his predecessor, he had the courage to operate under unfavorable circumstances, even to the opening of a knee joint to suture a patella. Dr. Wyman came into the operating room in time to see the knee open, and suggested to Dr. Stevens that he hand in his resignation for attempting so hazardous an operation.

Only since our last meeting have we lost our greatest public servant, Henry Pickering Walcott. His memorial must have a larger place than in this hasty sketch of our predecessors, whose scanty obituaries have been entered upon the Records of the Annual Meetings. Among these great practitioners who are still vividly remembered, are doubtless many who richly deserve more than passing mention. Too soon we lose the inspiration of their examples.

The importance of nursing, or perhaps rather the lack of it, in stressing the need for new hospitals is perhaps best told in the Silver Anniversary Report of the Newton Hospital. "It was nearly midnight. The warm October day had been followed by a cool evening. Awhile ago a messenger had hurried through the streets for a clergyman to minister to a dying person. The clergyman and the physician standing beside the sufferer had witnessed an unexpected resuscitation. The patient had been for awhile unconscious. She seemed to be dying. Old and friendless, some one must take care of her during the remainder of the night. The other inmate of the house was too old to be helpful, and so the clergyman and the doctor went out in search of someone to sit up with 'this stranger within our gates' until the morning. Two men toward midnight in search of a nurse! No trained nurse, of course, was to be had then, but they must find some kindly soul who would go to the lonely house and administer to the patient who seemed awhile ago to be in such deadly peril. Their search had been disappointing so far. Everyone had gone to bed and some who were awakened from their slumbers could not respond to the doctor's call. Some knew nothing about caring for the sick, others would not leave their children, still others were afraid, and so at last, the two men came to the house of an Irish woman, the mother of a brood of children. In response to the loud rap at the door, she put her head out of the second story window and called 'Who's there? What can you be wanting at this time of the night?' And the doctor told the story. When she heard the cry of need, her warm Irish heart could not resist. It was an appeal to her sympathies, and she said, 'Sure, I'll come and I'll do all I can.' And she did all she could; she was, in a sense, our first nurse. For the hospital idea was born that night. 'We must have a hospital,' said the clergyman to the doctor. The doctor replied, 'Yes, the time has come.'"

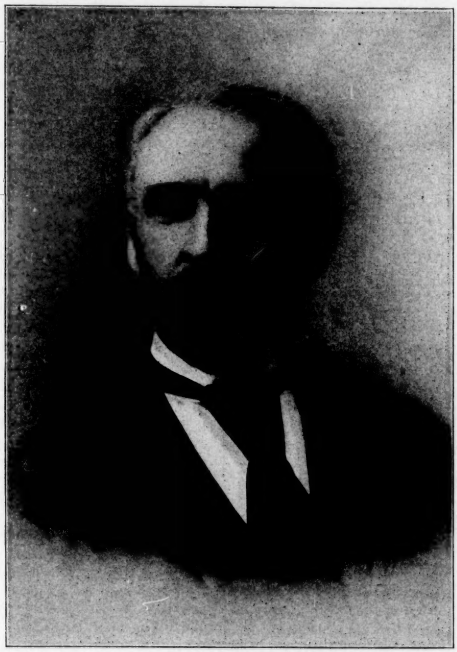
Shortly after this episode, the Rev. George W. Shinn called a meeting of some of the physicians of the city at his home to learn their views as to the need for a hospital in Newton. There were differences of opinion as to what school of medicine should control it. This was settled by bringing in both schools on an equal footing. The Newton Hospital then became the first one in this country to effect such an arrangement between the schools of medicine once considered so antagonistic. However, it took five years to settle this difficulty, to raise funds, and decide upon a suitable site. On June 5, 1886, about six weeks later than Cambridge, the Newton Cottage Hospital was dedicated. On the Fourth of July, Dr. William Otis Hunt, still an active Fellow of our Society, performed the first surgical operation, an amputation of the thumb. His father, Dr. Otis E. Hunt, built the house on the Post Road in Weston now occupied by Dr. Van Nüys. He practiced there for eighteen years, then moved to Waltham, and after ten years sold his practice to Dr. Edward R. Cutler. It was only when his son was about to begin the practice of medicine in Newtonville that he decided to continue in that town. Dr. Otis Hunt had been one of the fortunate few who had attended the first administration of ether at the Massachusetts General Hospital. Both father and son were active in the early affairs of the Newton Hospital.

In Waltham, we who are in practice there find traces of Edward R. Cutler which convince us that his life work should be made wore widely known. He was one of those who hurried from the Medical School into war service. For the first year, in a Massachusetts artillery regiment stationed in the fortifications of Washington, it was all easy enough, but when Grant took command, and the batteries were ordered to the front, then there began for young Cutler a terrific year. In his first battle, that of the Wilderness, he was promoted on the field for his bravery under the fire which decimated the regiment. Their heavy guns were not even fired.

Not until after the Army of the Potomac's triumphal return to Washington did Cutler and his young wife meet, and then they failed to recognize each other. The stripling youth had become a bronzed full-bearded man.

In Hartford, Conn., Cutler began general practice and made a wretched failure of it. Fortunately, his father was able to send him abroad to begin all over again his medical education, without which the young doctor insisted he could not and would not pretend to practice. After several years of hard work in Austrian and German hospitals, when Cutler again began practice—this time in Waltham—he was splendidly fitted for it. During the seventies his practice became enormous. His yearly average was one hundred and fifty obstetrical cases. Always on the road mornings, afternoons, and evenings; rarely not out at night, with office patients always awaiting his return, and for vacation only a day or two wading the Sudbury brooks for trout; yet his clinical note-books as well as his ledgers were always up-to-date, although many names in the former were never entered in the ledger.

In one or other of his bags one might surely find medical books and journals for his reading between his patients' pains, or while waiting for a tardy consultant. In this way Cutler kept abreast of the times and the fast changing science of medicine. Not only his library and his instrument kits were up-to-date: all that he had ever seen or read was also at his patients' instant service. For about fifty years Dr. Cutler gave his thousands and thousands of patients his very best. From the first day in the Wilderness, where under heavy fire he gave what help could be given to his wounded comrades on through the long years, until, broken in health he retired from practice, Edward R. Cutler gallantly and generously served his fellow-men with all his strength and mind and heart.



DR. EDWARD R. CUTLER.

In these days of financial depression, when for most of us our only good fortune is in escape from heavy taxes, it may be worthy of passing notice that Dr. Cutler's income (which never

exceeded $7,500 and in most years was much less) barely sufficed for his family needs, so that he left Waltham as empty of this world's goods as he was when born.

The outstanding contribution made by Dr. Cutler to surgical treatment was his work on appendicitis which, no doubt, was stimulated by his two energetic and brilliant young associates, Drs. Alfred Worcester and Henry Austin Wood. It seems fitting that I should outline here the sequence of events which led up to the first deliberate operation for acute appendicitis where the diagnosis was made, the operation carried out, and which terminated in a complete recovery for the patient.

In 1759, Mesteivier in France had incised an abscess of the abdomen; the patient died, and at autopsy a pin was found to have perforated the appendix. In England in 1812, Parkinson reported a death from inflammation of the appendix discovered at autopsy. Melier of France in 1827, said that perhaps lesions of the appendix had been overlooked at postmortem examinations, and that possibly an operation might be conceived to remove the trouble, and he hoped that some day that result might be reached. In 1839 in England, Richard Bright and Thomas Addison, gave the causes, the diagnosis, and the treatment of the disease, but left out operation as the means to the end. The first we hear of the disease in the U. S. was in 1837 when Wolcott Richards of Cincinnati found a perforated appendix at autopsy on a patient whose trouble had not been diagnosed. George Lewis of New York reported in 1856 a series of 47 cases where but three recovered. Howard of Montreal decided in 1858 that the disease was so infrequent that only one case appears in the practice of a physician at least in cities the size of Montreal. Mikulicz said in 1885 "in severe cases of typhlitis, even without perforation, the treatment hitherto employed should give way to operation."

Kronlein of Germany did the first real operation on a perforated appendix in 1884; the patient died in three days and it was not reported until 1886. Parker advised operation on the fifth day in 1886, and Fitz of Boston urged operation on the third day. Thomas G. Morton of Philadelphia, on April 27, 1887, operated for acute appendicitis, removed the organ, drained the cavity, and the patient recovered.

Dr. Cutler, as we have pointed out, was abreast of the times, and no doubt he had read the literature on the subject of this disease. He also knew of the case of the little girl, told of by Dr. Worcester at the meeting of the Surgical Section of the Massachusetts Medical Society last June, who had been sent home from the Massachusetts General Hospital to die in Waltham with a diagnosis of psoas abscess. You remember how he told us that he operated upon the girl, how he pushed an aspirating needle into the abscess, and then a bistoury, followed that with a Bigelow dilator, and with his fingers in the wound, he told his assistant that he had found a foreign body. "What is it?" asked the assistant. "It's corrugated and not living tissue" was the reply. "You are in the cecum and it's feces." Dr. Worcester said, "No, it isn't." "Pull it out, then." "I can't, it's hitched on," said Dr. Worcester. But he did pull, and it came away, and he threw the "stinking thing on the floor".

And Dr. Cutler remembered well that on Oct. 29, 1887 with Dr. Maurice Richardson, Dr. Fitz, and Dr. John W. Elliot by the bedside of his young associate who was sick unto death, Dr. Worcester had begged them to operate upon him for he knew what the trouble was, and that at least incision and drainage was the only possible treatment. And how the consultants had told him that he couldn't possibly mean that, and how his associate had replied, "Give me the knife's handle and I'll show you whether I do." And how that had been too much for the young physician's friend, Jack Elliot, who then operated with great success and the eventual recovery of the patient.

So on December 23, 1887 when Dr. Cutler was called to see a station agent, one C. S. Wiswall, with a pain in the right lower quadrant, with fever, and with local tenderness, he was able to crystallize the great mass of his knowledge and experience into action. He sent his handy man with an express wagon borrowed from a friendly undertaker, and his patient was soon in the Waltham Cottage Hospital, which had been in operation a scant two months. The operation was done much as we do it today with the exception of four silver wire sutures and a few superficial ones of boiled silk. An antiseptic dressing was applied. The patient was discharged perfectly well on January 6, 1888.

During this same decade there came to Massachusetts a physician who has left an indelible mark upon the history of Middlesex South, a man who will always stand out as one of the great benefactors of the people of Massachusetts. It was in 1887 that Walter E. Fernald came out of the West to take charge of the Massachusetts School for Feeble-Minded in South Boston. Shortly thereafter the school was moved to Waltham, where for 37 years he labored to place the state in the high position it now occupies in the care of the mentally deficient. His untiring energy and discerning foresight not only placed the work on a big scale in New England, but benefited thousands of retarded and backward children throughout the entire world.

Over thirty years ago, Dr. Fernald realized the need for greater public recognition of mental deficiency, for early diagnosis and treatment

of mental retardation, and that the problem was one of educating the medical profession as well as the general public. The crying need was for a method of determining the exact mental status of these retarded children before placing them in a special class. He created his well-known out-patient department for the parents and the children. He then conceived of projecting his out-patient examinations into the public school system, and so devised his traveling units to visit the schools of the state. The first examination in the public schools was under his supervision in Worcester in 1914. During that year 126 children were examined. At that time the mental defective was considered a menace to the community and a rather general public misconception of the whole subject had been built up. The clinics had to overcome these ingrained prejudices which had been growing through many years of misunderstanding. How well Dr. Fernald succeeded is proved by the results of his work since that time. In 1919 a law was passed by the General Court providing for the examination of the school children retarded three or more years and for the provision of special classes.

In 1921 in conjunction with the late Dr. George M. Kline, traveling clinics were created to operate from the fourteen state institutions for the care of mental diseases. Dr. Fernald took the personnel of these clinics to his school and trained them in the procedure of carrying out the examination in accordance with his well-known Ten Point Scale, which insisted that a picture of the whole child must be obtained before a conclusion could be reached as to the mental retardation and the proper method of treatment. In 1930, 51,205 children in the State were examined for mental deficiency.

Everything that was done on the grounds at Waltham was done under his immediate supervision and is his personal achievement. Perhaps his greatest work as a builder is the library of the school, pronounced by experts to be the most complete library on mental defect to be found anywhere in the world. Dr. Kline said of him: "Not only Massachusetts, but the entire world, owes a debt of gratitude to the sagacity, humanity, and foresight of this great man." After thirty-seven years of labor, he laid down his work on the evening of Thanksgiving Day, November 27, 1924.

Our decade of activities ended with the laying of the corner stone of the Malden Hospital in the autumn of 1890, although the building was not opened and dedicated until July 7, 1892. We had, then, at that time, the four major hospitals of Middlesex South finished, in operation, and caring for the needs of a large portion of our population. A great deal of the antagonism of the public had been overcome; training schools for nurses were meeting the need for nursing service in the hospitals and the homes of the rich and the poor; surgery was advancing by leaps and bounds toward the victories of the twentieth century. No longer did the people of the country districts have to travel laboriously over the muddy or dusty roads by carriage, or by a tiresome and slow train ride, to the Massachusetts General Hospital. They had hospitals of their own to take pride in, to work for, and to have their babies in. To quote again from "Small Hospitals": "The advantages of the smaller hospital have not yet obtained general recognition. The larger hospitals have still the prestige of years of splendid service; they have also the curses of self-satisfaction, of red tape in profusion, of sluggishness in adopting improvements. In them the individuality of the patient is lost sight of, the friends and the family can visit him only briefly and at stated times; the direct and immediate care of the patients is in the hands of house officers, who are either still students of medicine or at best graduates having acquired no skill in the art of healing. In the smaller hospitals the patient is under the care of his own physician or surgeon, who of course, is not so famous as they of the larger hospitals, but who nevertheless, will devote his whole attention to the patient, and who would not, even if he could, surrender the care of him to unskilled hands."

These hospitals of ours, all built within those ten years, had similar difficulties, similar poverty, similar ideas about architecture, location, ventilation; they all had controversies between members of the staff and the trustees; they all had to struggle for their existence. I want to emphasize that they all succeeded because of the courage, the foresight, and the energy of a few. They needed leaders and they found them in the men I have been telling you about. They all contended with hundreds of diphtheria cases, a good percentage of which were fatal; they all cared for about 100 patients the first year, only 25% of whom paid full rates; the average stay per patient was 24 days; they all had a few laparotomies with a 50% mortality; ten per cent of their patients had typhoid whose bodies had to be starved and bathed, and whose "bath tubs ought to be on wheels, so that the tubs may be carried full to the bedsides, and then wheeled back to their places for emptying," and whose death-dealing fumes were carried off by the same kind of elaborate ventilating systems which brought the odors of onions and cabbage into the wards from the kitchens. They were all built after similar plans and the "buildings occupied by the sick were furthest removed from the street; and the least agreeable buildings of the group from their associations, the Contagious Ward and the Morgue, were placed where they were least likely to be seen by the patients. The

Morgue was furthermore concealed by being combined in a group with the boiler house and the horse sheds. A separate entrance from the street, with a high wall and a gate, was provided at that point, hidden from the other buildings, for the entrance of the coal teams and the hearse. The horse sheds were commanded from the windows of the Administration Building, so that the doctors might be relieved of all anxiety concerning their horses."

Our hospitals are alike in that they serve similar numbers of people in similar towns. They are all private corporate institutions doing work only a part of which is paid for by the patient. They have all been standardized more or less by the requirements of the American College of Surgeons, and in an attempt to meet these minimum requirements, they have been forced into a building program which has depleted their resources. They all take better care of their patients than they did in the past, due rather to the advances in medical science than to more careful personal attention. They have all increased the amount of their work because of increased facilities, lower mortality rates, and fewer patient-days in the hospital. The cost per patient has steadily risen, and we have as a result the much discussed, "High Cost of Medical Care."

The problems of our hospitals during the next decade will be economic; costs must be kept within an assured income; the cost per patient must be kept down and perhaps lowered; the care of all the people all the time must be assured; the training of nurses, internes, residents, and graduate physicians must be intensified and made general; the public must be instructed and their support of their own hospitals must be increased.

Dr. Allen B. Kanavel writes: "The staffs of standardized hospitals, both physicians and nurses, need a broader conception of the functions of these hospitals, and they must divest their minds of the idea that they are founded solely to furnish medical care to the patients coming to their doors. The civic hospital must become a teaching centre. Moreover it has a wider function, for it must instruct the public as well as the profession. The modern hospital must provide for the instruction of internes, for pathological conferences, for the development of residents, and for the bedside teaching of the new diagnostic methods and treatment of the common every-day conditions by qualified members of the profession to the graduates in practice in the community. Thus, with the conception of the standardized hospital as a teaching centre where the interne will secure the better training for practice, the aspiring specialist receive his instruction, the general practitioner find his post-graduate instruction, and the public be informed of the principles of scientific medicine and instructed in the simpler procedures necessary for home nursing, will a gap be filled in our system of medical instruction, improved fraternal spirit engendered, and to the hospital will be attached the warm and sympathetic support of the public."

If the hospitals of Middlesex are to carry on, if the physicians of Middlesex are to maintain the standards of their predecessors, they must be willing to do no less than they of the past have done. The doctor of the future must take an increasingly greater interest in the economic side of medicine. He must not willingly place himself below the hospital superintendents and trustees, when he knows perfectly well that he and his brothers are the hospital. He must be willing to teach, or to serve as an apprentice as the case may demand, he must be willing to permit the segregation of work in order to insure the best results and to acquire the most knowledge about a given subject; he must work, and learn, and finally take responsibility.

Some of our hospitals have been taken over by Boston doctors; some of our hospitals have been given over to Boston doctors. I feel sure that none of the men of Middlesex whose names may appear in any future oration will be found to have achieved greatness through their connections with those hospitals. I cannot imagine the men I have been telling you about today taking any subordinate position in the hospitals they had worked so hard to produce. They were builders, not destroyers; they commanded, and obeyed, only their consciences; they were adventurers and not weaklings. They found time to force legislation which they knew favored public welfare and which might enhance their own position; they attended to the duties of their state and county societies; they wrote and taught and attended to the ills of their patients under the most trying conditions which we know little of these days. They gave us the hospitals and the heritage which is ours.

"For in their youth they learned the art of healing as apprentices, which, in spite of the present methods, is really the only way any art can be learned."

A CLINICAL STUDY OF AEROPHAGIA*

BY JULIUS FRIEDENWALD, M.D.,† AND SAMUEL MORRISON, M.D.†

AEROPHAGIA is a condition characterized by the swallowing of air. Following the introduction of air into the stomach, where it may remain for a time, it is either eructated or passed through the pylorus into the intestine and may even be expelled through the rectum. Aerophagia is not uncommon and is a symptom observed in various affections. While this condition was a matter of general interest even in the time of Hippocrates, it has only been within recent years, as a result of radiological studies, that its actual significance has become recognized.

Both Gerardin[1] and Déjardin[2] described aerophagia, the latter calling attention to a case in a conscript, who in order to avoid military duty produced abdominal tympanities by the swallowing of air. Magendie[3] noted the ease with which this affection could be acquired. Bouvier[4] and Pierquin[5] fully described the act, the latter calling attention to the value of this process as a therapeutic measure in certain gastric affections. Further descriptions were presented by Andral[6] and Chomel[7]. Chomel recognized the fact that air might be introduced directly into the stomach through the mouth but was inclined to believe that the condition was far more likely to arise as a result of the continuous exhalation of gas from the mucous membrane of the digestive tract. Villieme[8] however, opposed the theory of the generation of gas in the gastro-intestinal tract in this condition and ascribed the eructations noted in certain individuals to alternate swallowing and expulsion of atmospheric air. Credit, however, is due to Bouveret[9] who in 1891 described most elaborately the mechanism of this act and who likewise originated the term aerophagia. Since that time, numerous observers have contributed to various phases of the literature of this subject among the most important of these are the air aspiration theory of Oser[10] supported by Quincke[11]. They ascribed this condition to aspiration, the air being suctioned in and expelled through the esophagus by expansion and contraction of the stomach. According to Linossier[12] aerophagia is considered much in the light of regurgitation and while in regurgitation there is an expulsion of food, in the former condition, there is an expulsion of air.

It is well known that air swallowing is by no means limited to man. It is noted among certain animals, especially the horse. Spivak[13] describes this affection according to the observations of A. M. Farmington as follows: "Indigestion or dyspepsia was formerly attributed as the cause of air-swallowing, but later observers have more properly classed it with the vices and in the same category with a considerable number of other whims, bad or vicious habits, resulting, in most instances from idleness, which the horse, free from restraint, incessantly repeats without any other motive in reality than the gratification of desires which finally became imperative but which always interfere with his complete serviceability. The modes by which the horse accomplishes the act of air swallowing are known by the names of cribbing and wind-sucking. Usually in cribbing, the horse takes a point of support or contact for his upper incisor teeth, which causes an abnormal wear of the teeth and the vice can thus be detected. Less frequently he cribs in the air, without taking a point of contact and becomes what is called a wind-sucker. To crib in the air, the animal begins a rapid up-and-down movement of his lips, then suddenly lowers his head—sometimes to the level of his knees and swallows a mouthful of air, most frequently with the production of a guttural sound, which has sometimes been wrongly interpreted as eructation. When the effort is not successful and is confined to the simple act of deglutition of saliva the attempts are renewed until the desired satisfaction is secured. A colt of a cribbing mare has been known to acquire the vice long before the age of one year. The muscles used in air-swallowing are not different, nor is the mechanism apparently different, from the act of deglutition generally. Remedies attempting to overcome this condition seem to be of little avail."

The more important recent contributions relating to air swallowing are those of Spivak[13], Leven and Barret[14], Ewald[15], Thomas[16], Bouchholz[17], Kantor[18], Leven[19] and Winkelstein[20].

The mechanism involved in the formation of gas in the stomach is of interest. The oxygen and nitrogen arise from the swallowed air and it has been demonstrated that carbon dioxide is normally produced in the stomach itself. The evidence as to whether this form of gas can be produced under pathological conditions in extremely large amounts is not entirely satisfactory, although Bardet[21], and Woodyatt and Graham[22] found it in large quantities in cases of flatulency and acute dilatation of the stomach. On the other hand, Kantor has observed a relatively high proportion of CO_2 in the gases obtained from the stomach of normal individuals.

It is generally conceded that the swallowing of air and its discharge as the result of eructations constitute a perfectly normal physiological

*From the Gastro-Enterological Clinic of the Department of Medicine, University of Maryland, Baltimore.

†Friedenwald—Professor of Gastro-Enterology, University of Maryland. Morrison—For records and addresses of authors see "This Week's Issue," page 1384.

process in some way possibly regulating pressure within the stomach itself.* With each act of deglutition a certain amount of air passes subconsciously into the stomach and is eructated or settles in the upper left portion of the stomach forming the so-called magenblase, a stomach bubble. The air may thus find its way into the stomach normally when swallowed with food or it may be gulped down and forcibly and audibly eructated. In addition there is a form of aerophagia—the well-known eructatio nervosa—occurring in individuals of a neurotic type who have learned to swallow air voluntarily, forcing it into the esophagus without its entering the stomach and expelling it audibly and explosively by means of intrathoracic pressure. While this type of air swallowing ordinarily occurs in neurotic individuals it is often practiced in patients with organic disease, either abdominal or cardiac, as a means of affording relief from discomfort. A conditioned reflex is thus brought about which may become an important symptom of organic disease recognized under the term eructatio symptomatica (Winkelstein).

Meltzer[23] describes aerophagia as the ability voluntarily to swallow air with a minimal amount of food or drink. The pharynx at rest contains a small amount of air. Deglutition is initiated by raising the larynx and the fleshy part of the tongue, which is reflexly pressed into the pharynx acting as a piston forcing the contents of the pharynx into the esophagus which has become relaxed. The following peristaltic wave sweeps down the remaining contents into the esophagus and the stomach, thus carrying in a small quantity of air when the swallowing is without food. When this process occurs without food, the quantity of air swallowing is larger than with it. A part of the air escapes upward without occasioning a noise. Even this slight eructation is followed by what is termed by Meltzer, a secondary peristalsis, a peristalsis of the esophagus not preceded by an act of deglutition. Some individuals are capable of producing a large number of empty swallows in succession and this may induce marked distention of the cardia of the stomach, increasing its tonicity, which may prevent the ready escape of air from the stomach. The ability of accomplishing many empty swallows in succession is probably based upon the lowered reflex threshold of these individuals. Aerophagia is therefore produced, according to Meltzer, by a succession of empty swallows in individuals whose threshold for deglutition reflexes is abnormally low.

Cannon and Lieb[24] were the first to report roentgen-ray studies on the process of deglutition and demonstrated that fluids were rapidly forced down the esophagus while solids and semi-solids descended slowly as the result of peristaltic movements. Kraus[25], following a similar study, showed that the bolus of food passed slowly into the stomach through the cardia due to the pressure of the esophageal peristole followed by an air bubble, instead of being pushed through rapidly. The second swallowing sound described by Meltzer was investigated from an x-ray point of view by Hertz[26] who demonstrated that this occurred immediately following the passage of the food from the esophagus into the stomach, though it was Kraus who had first definitely made the observation that this occurred as the result of the air introduced coincidently into the stomach.

Kantor[18] in an exhaustive study of this subject pointed to three periods in the process of deglutition: (1) buccopharyngeal, (2) esophageal and (3) cardiogastric. His x-ray studies are of the greatest importance. He demonstrated that the time of occurrence as well as the number of deglutition murmurs depend entirely upon two factors, the position and distribution of air in the bolus. If, according to this observer the cardia is relaxed on the arrival of food, a certain amount of air may precede the bolus causing the first deglutition murmur of Meltzer. However, if the cardia is contracted, the air passing upward rises to the top and only the second deglutition murmur is noted. He also showed that while in the fasting state no magenblase is ordinarily observed, following the act of deglutition a definitely defined bubble becomes apparent which increases as the stomach becomes filled. In contradistinction to the swallowing of air with food, the entry of air alone into the stomach is termed by Kantor "air gulping". The air present normally in the pharynx is forced into the esophagus again, expelled by an increase in the intrathoracic and esophageal pressure by means of forced expiration with the glottis closed. If following this procedure other empty swallows are continued, the air forced into the esophagus may be propelled through by active peristaltic movements or may be squirted directly into the stomach.

Following its passage into the stomach, the air usually escapes through the esophagus as a result of eructations, due to relaxation of the cardia. Esophageal and gastric eructations differ in the fact that the former are voluntary while the latter are not. On the other hand, forced esophageal expulsion of air is frequently practiced by individuals affected with gastric distress in order to produce an expulsion of gas from the stomach. While most of the air is eructated, some may pass into the intestine, especially the nitrogen and CO_2, the oxygen having been rapidly absorbed through the stomach wall.

In connection with aerophagia, the condition

*Belching is considered a perfectly normal and elegant procedure in China. Following a repast the guest approaches the host and eructates into his face, thus expressing his great satisfaction with his meal.

known as pneumatosis must likewise be considered. In pneumatosis, the stomach is distended with large amounts of swallowed air, expulsion of which may be impossible, causing an unpleasant expansion of the stomach, with dyspnea. The air may or may not be introduced with a meal. The usual explanation for the occurrence of this condition, as revealed by means of the roentgen ray, is the simultaneous occurrence of cardiospasm and pylorospasm, and relief is in consequence at once afforded as soon as the spasm is overcome and the air escapes. The condition is fully described by Rieder[27]. In many instances of this condition a gas bubble may be observed due to the swallowed air trapped in the stomach.

Etiology: Aerophagia may be observed associated with many affections and in some instances this condition may even overshadow the usual important symptoms of organic disease. The most common type is the neurotic form and this is usually esophageal in character. It is ordinarily observed in hysterical and neurotic individuals, resulting from mental excitement such as worry, anger or sorrow. It may occur or be produced as a voluntary act and is then usually followed by the noisy expulsion of air. Eructatio nervosa is more common in females and especially in younger individuals. In a series of 1592 cases of gastric neuroses collected by one of us[28] there were 54 instances of eructatio nervosa (four per cent) 42 of whom were females and 12 males. In 50 other cases in which aerophagia was symptomatic of organic disease, there were 21 females and 29 males.

Aerophagia may likewise occur as the result of various digestive affections, functional or organic, in which the patient seeks temporary relief from epigastric distress. This may become so frequent that it finally assumes an involtary form, and as has already been stated may be the presenting symptom of an organic affection. This form of eructation, eructatio symptomatica, may result from disturbances of the pharynx, of the salivary glands, gastric carcinoma, ulcer and acute and chronic dilatation of the stomach. It occurs in gall bladder disease, especially in cholelithiasis, in abdominal adhesions and in intestinal obstruction as well as in pulmonary and cardiovascular diseases. It is not uncommonly observed in the secondary dyspepsias due to diseases of the lungs, heart and genito-urinary system.

Symptomatology: Aerophagia usually develops suddenly and is associated with forcible noisy eructations varying much in intensity, the paroxysm lasting a longer or shorter time. At times there is a period of quiescence between paroxysms. The number of eructations may vary greatly. In some instances the patient is able to inhibit this habit at will, in others this is impossible. The attack is usually spasmodic in character, disappearing suddenly and ceasing during sleep. Pressure and fullness in the epigastrium may at times accompany it and usually appear as soon as the food enters the stomach, associated not infrequently with distention. These symptoms may continue until the stomach is completely empty. The belching is often so distressing that it occasions severe pain requiring the removal of corsets in females and the opening of waist belts and trouser bands in males. This is due to increased intragastric tension. Occasionally periodic vomiting is observed, often, however, without nausea. Painful spasm of the cardia and pylorus may occur giving rise to the condition already described as pneumatosis in which the stomach becomes distended with air, the expulsion of which is impossible, thus causing severe expansion of the stomach and dyspnea, relief from which is at once afforded when the spasm ceases and the air escapes.

Rebellious forms of hiccoughs are at times associated with aerophagia but usually disappear with the relief of the latter affection. Occasionally the two conditions may alternate. In those instances in which air passes into the bowel, intestinal colic may occur together with flatulency, emissions of gas from the bowel and constipation. In addition circulatory and respiratory symptoms in the form of tachycardia, arhythmia and dyspnea which may become extremely distressing due to excessive distention, are not uncommonly noted. This is especially observed in pneumatosis in which eructations are not so common, yet the patient is most uncomfortable following meals. Pneumatosis occurs in two forms. In the first it appears in the acute type intermittently with alarming signs of dyspnea, cyanosis, vertigo and syncope and with a rapid and irregular pulse. The region of the stomach is distended and the patient is unable to relieve himself by eructating notwithstanding the frantic efforts in this direction. In the second type the attacks appear immediately following meals or some time later or after some exertion. The symptoms are much like those in the acute type but not so alarming. The term asthma dyspepticum has been applied to the type which involves chiefly the respiratory functions (Henoch).

In other instances of aerophagia, angina-like attacks may occur with arhythmias and extrasystoles of the heart and, according to Leven, even paroxysmal hypertension may be observed at times.

On examination, patients affected with aerophagia are ordinarily observed to be neurotic individuals who present the usual nervous stigmata. The tongue is usually moist and red. A significant sign of air swallowers is that dur-

ing the examination the patient will incline his head upon his chest and then draw it back to swallow. On inspection of the abdomen following deep respiratory movements the epigastrium is found to project forward in inspiration and is retracted in expiration, which, according to Leven is the reverse of what occurs under normal conditions. On palpation of the abdomen, more or less resistance is noted in the area of the stomach with a tympanitic note in this region proportionate to the degree of distention. There is also present a rather increased sensibility to pressure in the epigastrium. Pressure in this area as has been demonstrated by Badowin will occasionally induce eructations (aerophagia point). A succussion sound may likewise be produced at times due to the admixture of air and fluid in the stomach.

Examination of gastric contents may or may not reveal normal conditions. In a series of fifty cases affected with eructatio nervosa, normal acidity occurred in 41 (82 per cent), hyperacidity in six (12 per cent) and subacidity in three (six per cent). In another series of 50 cases in which the aerophagia was associated with organic disease, almost similar findings were obtained, normal acidity in 38 (76 per cent), hyperacidity in eight (16 per cent) and subacidity in four (eight per cent).

The abstracts of the histories of the following four cases present typical illustrations of the usual types of aerophagia.

CASE I. Female, aged 44 years, who had been nervous for many years was taken with violent attacks of noisy eructations which she attributed to indigestion. The attacks began in the morning soon after breakfast and continued with more or less frequency during the day. She consequently has been eating but little, and has lost considerable flesh. The physical examination was negative except for a slight distention in the epigastrium. The x-ray examination revealed nothing more than a large magenblase. The patient was entirely relieved of her attacks by a simple explanation of the nature of the condition as a voluntary act, and the exercising of self-control.

CASE II. Female, aged 25 years. Following great sorrow and a series of worries, the patient began to complain of attacks of violent spasmodic eructations occurring frequently during the day. On physical examination a slight distention in the epigastric region was noted during an attack; the examination was otherwise negative except that there was marked emaciation and in actuality a loss of twenty pounds due to abstinence from food. The patient was not completely relieved until a regain in weight was brought about as the result of a six weeks' rest cure.

CASE III. Male, aged 41 years. This patient was affected with violent attacks of distention in the upper abdomen occurring three to four times daily, which were associated with tachycardia, dyspnea, vertigo and faintness. Some of the attacks were so severe as to become alarming, but could at once be relieved by means of violent forcible eructations. Upon one occasion the attack was so violent that relief was not afforded until the introduction of the stomach tube which was immediately followed by an explosive expulsion of air. On physical examination, nothing abnormal was detected except a moderate degree of abdominal distention during an attack which disappeared following a forcible eructation. On fluoroscopic examination, a cardiospasm was noted together with the appearance of a large magenblase which likewise was much reduced in size following the emission of air. It was evident that we were dealing with the condition recognized as pneumatosis. The patient was entirely relieved by means of a few dilatations of the cardia as the result of the introduction of esophageal sounds.

CASE IV. Male, aged 53 years. A very nervous individual who had been an air swallower for many years began during the last two months to experience discomfort in the abdomen in the form of colic occurring two to three times daily. The pain was first noted in the region of the stomach and then descended into the lower abdomen, being followed by immediate relief with the passage of large volumes of odorless gas from the bowel. A physical examination during an attack revealed a marked distention in the gastric area followed by a sudden gurgle with distention of the lower abdomen, the fullness rapidly disappearing from the region of the stomach. This process was accompanied with pain in the lower abdomen which continued until gas had been expelled from the bowel.

DIAGNOSIS: The diagnosis of the nervous type of aerophagia is not usually difficult. The characteristic paroxysmal attacks can scarcely be mistaken. There is an absence of organic disease. The gastric contents are usually normal. The gas expelled is atmospheric air and reveals no signs of fermentation, while in the general examination "neurasthenic" and hysterical symptoms can be detected. The fluoroscopic examination furnishes an important aid in the diagnosis. In most instances, when the patient is examined roentgenologically as the meal passes down the esophagus, it is observed to be interspersed with large amounts of air which, after moving upward and downward may give rise to considerable distention of the tube. After a time, the air passes through the cardia and forms the so-called magenblase or air-bubble. This occurs in some instances as a temporary manifestation, appearing in various forms and sizes, frequently changeable, reappearing and disappearing from day to day. On the other hand it may remain constant, the so-called chronic air bubble. The magenblase consists entirely of swallowed air which is trapped in the stomach in the form of a semi-circular light cap in the region of the upper pole under the dome of the diaphragm. Occasionally the amount of air accumulated may become so marked as to displace the left side of the diaphragm upward and by exerting pressure upon the heart and lungs embarrass the functions of these organs. Frequently no distinct magenblase is revealed in the fasting state; it appears, however, with the first and increases with each additional swallow of the meal.

Greater difficulty arises in the diagnosis in those instances in which the aerophagia occurs as a symptom of some organic affection. It may

even occur at times as the presenting sign. It occurs especially in cardiovascular disease in which the air swallowing may precede the usual signs by a considerable period of time and thus mask the true affection. In other instances the cardiovascular lesion is aggravated by aerophagia outbursts. This condition must necessarily be differentiated from aerophagia in which symptoms of a cardiovascular type occur.

The following cases illustrate this type:

CASE V. Male, aged 54 years. The patient has complained of attacks of noisy eructations which have continued over a period of six months. There have been in addition periods with slight shortness of breath occurring mainly upon exertion, following meals and at night upon retiring. The eructations have been most intense at that time. The presenting condition for which this patient sought medical advice was unquestionably the distress due to aerophagia. A physical examination indicated, however, that he was actually the victim of cardiovascular disease. There were definite indications of cardiac enlargement with beginning decompensation. The urine contained albumin and casts. With rest in bed and therapy directed to his cardiovascular disease, the decompensation was overcome and with it the aerophagia disappeared.

On the other hand the following case presents the very opposite condition.

CASE VI. Male, aged 34 years. Medical advice was sought by this individual for attacks of abdominal distention, associated with shortness of breath, palpitation, noisy eructations, dizziness and attacks of vertigo. He was definitely convinced of the serious involvement of his heart and that all of his symptoms were entirely produced by this cause. On physical examination the patient by no means presented the appearance of one seriously ill. His color was good and he had lost no weight. His heart and lungs were normal, blood pressure 124/80, urine normal. The abdomen was markedly distended in the gastric area but the fullness disappeared immediately following an explosive eructation. With physical exercise combined with psychotherapy and with the necessary explanation to the patient that the air was swallowed and that his heart was entirely normal, his confidence was regained and his entire disability overcome within a few weeks.

It must be remembered that it is not uncommon to observe instances of gall bladder affections, especially those of cholelithiasis, occurring in middle-aged obese women, in which aerophagia precedes the usual symptoms of the disease many months and even years.

The following case represents this type of air swallowing:

CASE VII. Female, aged 54 years. This patient consulted us for distressing attacks which had extended over a period of years, consisting of eructation of the noisy aerophagic form. These had gradually become more and more intense and were often of several hours' duration. They were not associated with the meals and were relieved by induced vomiting. In obtaining a complete history the patient remembered having had a number of acute attacks of abdominal pain, each of a few hours' duration, which had occurred six or eight years back. A physical examination revealed no abnormalities. The patient was extremely obese, but the abdomen presented no enlargements or any distention. An x-ray examination, however, revealed the presence of a number of gall stones. After a few weeks the patient had a violent attack of gall-stone colic which was followed by jaundice. A cholecystectomy was finally performed and she made a most satisfactory recovery with an entire disappearance of the aerophagia.

It is important, therefore, that the diagnosis of nervous eructations should be made only following a thorough clinical investigation by which evidence of organic disease is entirely ruled out.

Treatment: In the treatment of mild types of eructatio nervosa much can be accomplished by an explanation of the mechanism of the act to the patient with the admonition of self-control of the attacks. At times, however, this is difficult especially if the habit has grown to such a degree that the patient, notwithstanding every effort, is unable to exert sufficient control. We must then content ourselves with the treatment directed toward the neurasthenic state. This may be accomplished by means of psychotherapy, hydrotherapy and change of scene. In individuals who are debilitated and have lost considerable flesh, nothing will bring about such excellent results as a well-regulated rest cure. In those instances in which the eructations are violent and continuous, temporary relief may be obtained by having the mouth kept open by placing a cork between the teeth. As a result of this measure the eructations are overcome as the patient is thus prevented from swallowing. In acute attacks with pneumatosis the introduction of the stomach tube will afford instant relief. Occasional dilatation of the cardia may be indicated in some instances. Drugs are usually of minor value; among those utilized in this condition with more or less effect are the bromides, phenobarbital and atropine. Boas advises the employment of physostigmine gr. 1/6 (0.01 gm.) together with the extract of nux vomica gr. 1/3 (0.02 gm.) three times daily. If the aerophagia is the result of some organic disease, the treatment must necessarily be directed to the primary condition.

CONCLUSIONS

1. Air swallowing is a normal physiological phenomenon. It becomes abnormal when the air is swallowed or gulped in large amounts.

2. Aerophagia may be a voluntary or involuntary process.

3. The form known as eructatio nervosa occurs in neurasthenic and psychasthenic individuals and is usually a voluntary act, though it may finally become involuntary.

4. While aerophagia is ordinarily an unimportant condition, it may in course of time become so aggravated as to undermine the patient's general health and thus lead to serious manifestations.

5. Aerophagia may be symptomatic of organic lesions such as digestive affections and cardiovascular and respiratory diseases. It has on this account been termed eructatio symptomatica (Winkelstein).

6. When air is trapped in the stomach as occurs in pneumatosis, it may cause severe cardiorespiratory symptoms.

7. In the treatment of the usual forms of aerophagia attention must be especially directed to the nervous system, and psychotherapeutic measures are largely indicated. In the symptomatic form the treatment must be directed to the primary disease.

REFERENCES

1 Gerardin, N. V. A.: Recherches physiologiques sur les gaz intestinaux, Paris, 8:9-63, 1814.
2 Déjardin: Gas intestinaux, Thèse de Paris, 1814.
3 Magendie, F.: Mémoire sur la deglutition de l'air atmosphérique, Paris, Migneret, 1813.
4 Bouvier: Mémoire sur la deglutition de l'air atmosphérique. Nouv. Bib. Med. 3:21, 1826.
5 Pierquin: Réflexions sur la deglutition de l'air et sur l'utilite qu'on pouvant en retirer dans le traitement de maladies. J. de méd. de chir. et de pharmacol. 3:319, 1830. Quoted by Kantor (reference No. 18).
6 Andral, G.: Cours de pathologie interne, Ed. 2, Paris, 1:124, 1848.
7 Chomel, A. F.: Des dyspepsies, Paris, Masson, 1857, p. 87.
8 Villieme: Traite sur les dyspepsies essentielles, Paris, 1866.
9 Bouveret, L.: Spasmes Cloniques Du Pharynx. (Aerophagie Hysterique.) Rev. de med. 11:148, 1891.
10 Oser: Die Neurosen des Magens und ihre Behandlung, Wien und Leipzig, Urban & Schwarzenberg, 1885.
11 Quincke: Ueber Luftschlucken. Verhandl. d. Kong. f. inn. Med. 8:377, 1889.
12 Linossier, M.: Discussion on "Etude sur L'Aérophagie etc." by Albert Mathieu and R. Follet. Bull. et mém. Soc. méd. d. hôp. de Paris. 18:299, 1901.
13 Spivak, C. D.: Aërophagia and flatulence. M. Rec. 67:649 (Apr. 29) 1905.
14 Leven, G., and Barret, G.: Radioscopie gastrique et maladies de l'Estomac, Paris, Octave Doin et fils, éditeurs, 1909. 20 & 37.
15 Ewald, C. A.: Ueber Gas- (Luft-) Ansammlung in Leibe und ihre Behandlung. Deutsche med. Wchnschr. 36[1]: 641, 1910.
16 Thomas, J.: Thèse, Paris, 1912—quoted by Kantor (reference No. 18).
17 Bouchholz, E.: Thèse, Paris, 1913—quoted by Kantor (reference No. 18).
18 Kantor, John L.: A study of atmospheric air in the upper digestive tract. Am. J. M. Sc. 155:829, 1918.
18a Kantor, John L., and Marks, Jerome A.: A study of intestinal flatulence. Ann. Int. Med. 3:403, 1929-30.
18b Kantor, John L.: The physiology of Aerophagia. M. Rec. 93:129 (Jan. 19) 1918.
19 Leven, G.: L'Aerophagie, Paris, Octave Doin & fils, editeurs, 1920.
20 Winkelstein, A.: Some clinical features of air swallowing. J. A. M. A. 94:1480 (May 10) 1930.
21 Bardet: Composition des gaz des l'eructations. Bull. et mém. de la soc. de med. et de chir. prat. de Paris, 1894, page 122.
22 Woodyatt, R., and Graham, E. A.: Alimentary respiration, etc. Ohio State M. J. 8:407 (Aug. 15) 1912.
23 Meltzer, S. J.: Physiology of aerophagia. M. Rec. 93:100 (Jan. 19) 1918.
24 Cannon, W. B., and Lieb, C. W.: The receptive relaxation of the stomach. Am. J. Physiol. 29:267, 1911-12.
25 Kraus, F.: Die Bewegungen der Speiseröhre unter normalen und pathologischen Verhältnissen auf Grund röntgenkinematographischer Untersuchungen. Ztschr. f. exper. Path. u. Therap. 10:363, 1911-12.
26 Hertz, A. F.: The passage of food along the human alimentary canal. Brit. M. J. 1:130, 1908. Ibid: Guy's Hosp. Rep. 61:389, 1907.
27 Rieder, H.: Die Pneumatose des Magens. München. med. Wchnschr. 64:1353 (Oct. 16) 1917.
28 Friedenwald, J.: Functional diseases of the stomach. Osler's Modern Medicine, Philadelphia & New York, Lea & Febiger, 3:307, 1926.
29 Baudouin, Marcel: Les Fontaines qui guérissent Culte des Eaux et Maladies préhistoriques. Gaz. méd. de Paris. 4:1 (Jan. 2) 1904.

CHAUCER AND MATTERS MEDICAL

BY NILS W. BOLDUAN*

IT is a platitude to say that a serious study of the literature of a people is bound to throw some light on the cultural activities of that people. This obvious conclusion, however, is too frequently forgotten and a source of enlightenment and enjoyment is lost to those seeking an insight into the development of some particular phase of human activity.

Let us try to catch a glimpse of the vast background of Medical Art by looking at a well-known work of English literature from the physician's viewpoint. The object is to stimulate an interest in the medieval phase of Medicine, not to add to the body of documentary knowledge.

It is generally conceded that Italy was the cradle of the Renaissance in the XIII and XIV centuries. There it was that the student as well as the teacher traveled from city to city in search of learning. "In this peripatetic fashion, not only did the seeker of wisdom derive what he sought, but learning was more generally diffused, and the scope of men's minds broadened and mellowed" (Packard). The impressions and experiences of these traveling scholars were transported to England and incorporated into English thought, among others by Geoffrey Chaucer (1340-1400), who had visited Italy in 1373. During this visit was built the solid foundation on which he developed his genius.

From Chaucer's writings we see how broad is the scope and how mellow is the complexion of his mind. We recognize in him a man of cheerful and genial nature, a keen observer of men, and at the same time an enthusiastic and untiring student of books. Although he did not enjoy the advantage of a formal university education, his reading was catholic, including French and Italian literature, and his acquaintance with medieval learning was thorough.

Among the writings which held a high place in the eyes of the medieval scholar was the Regimen Sanitatis Salernitanum. That Chaucer was acquainted either with the original or with an English adaptation of it may be inferred

*Bolduan—For record and address of author see "This Week's Issue," page 1384.

from the parallelism between the following passage (Nonne Preestes Tale, line 4028-29)—

> Attempree dyete was al hir phisyk,
> And exercyse, and hertes suffisaunce.

and that in the Regimen,—*

> Si tibi deficiant medici, medici tibi fiant
> Haec tria, mens laeta, requies, moderata diaeta.

Another striking example of the breadth of Chaucer's knowledge is in the first two lines of "The Parlement of Foules". These are—

> The lyf so short, the craft so long to lerne,
> Th'assay so hard, so sharp the conquering. . . .

They do not serve to introduce a subject pertaining directly to medicine, yet they are almost identical with the first of the Hippocratic aphorisms. "Life is short, the art long, opportunity fleeting, experience treacherous, judgment difficult."

A passage in the Pardoner's Tale referring to Avicenna,—

> But certes, I suppose that Avicen
> Wroot never in no canon, ne in no fen. . . .

has probably no particular significance beyond the fact that the Canon was known to the intelligent laity of the XIV century.

From these few excerpts, I think the conclusion is justified that Chaucer is well fitted to give an account of fourteenth century Medical Art as it presented itself to the educated class at that time. Not being a doctor himself he is free of any petty professional jealousy; at the same time, he shows a rather comprehensive knowledge of the subject,—a characteristic so frequently lacking in the lay critic.

Although Chaucer does not present a complete picture anywhere, we can gather much from isolated passages to throw light both on his own views and opinions on Medicine and on Medieval Medicine as such. Petrarch, a contemporary, is known to doctors because of his repeated vehement attacks on the profession. But with Chaucer we have no such coherent and forcibly expressed statements. His is rather a point of view that must be gleaned here and there from his works.

It is my purpose to point out those passages in the Canterbury Tales from which a clear insight into Chaucer's opinion may be gained. In some cases the relation to Medicine may seem slight, in others even far-fetched. Since the interpretation of a passage is affected by the knowledge or ignorance of the interpreter, and since the writer does not pretend to expert knowledge in this field, some of the instances cited may be open to criticism. It is believed that they will find a proper place when integrated with all the rest. The passages quoted may also seem somewhat disjointed. However, an attempt has been made to arrange them into two general groups,—the first dealing largely with the ideas, superstitions and practices prevalent in the healing art during the fourteenth century, and the second dealing more or less with the personalities of those who followed or professed to follow this art.

The firm hold taken by the humoral doctrine, with all its implications, on the XIV century lay mind is particularly evident from the following,—

> "Swevenes engendren of repleccioun̄s,
> And ofte of fume, and of compleccioun̄s,
> Whan humors been to habundant in a wight.
> Certes this dreem, which ye han met to-night,
> Cometh of the greet superfluitee
> Of youre rede colera, pardee,
> Which causeth folk to dreden in hir dremes
> Of arwes, and of fyr with rede lemes,
> Of grete beestes, that they wol hem byte,
> Of contek, and of whelpes grete and lyte;
> Right as the humour of malencolye
> Causeth ful many a man, in sleep, to crye,
> For feere of blake beres, or boles blake,
> Or elles, blake develes wole hem take.
> Of othere humours koude I telle also,
> That werken many a man in sleep ful wo;
> But I wol passe as lightly as I can.
>
> . . . . . .
>
> 'Now, sire,' quod she, 'whan we flee from the bemes,
> For Goddes love, as tak som laxatyf;
> I counseille yow the beste, I wol nat lye,
> That bothe of colere and of malencolye
> Ye purge yow. . . .
> . . . Ye been ful colerik of compleccioun̄.
> Ware the sonne in his ascensioun̄
> Ne finde yow nat repleet of humours hote;
> And if it do, I dar wel leye a grote,
> That ye shal have a fevere terciane,
> Or an agu, that may be youre bane.
> A day or two ye shul have digestyves
> Of wormes, er ye take your laxatyves,
> Of lauriol, centaure, and fumetere,
> Or elles of ellebor, that groweth there,
> Of catapuce, or of gaytres beryis,
> Of herbe yve, growing in our yerd, that mery is;
> Pekke hem up right as they growe, and ete hem in."
>
> —Nonne Preestes Tale
> lines 4113-4157

Also in the descriptions of the Franklin and Reve in the Prologue we encounter a reference to the "sangwyn" complexion of the former and the characterization of the latter as a "sclendre colerik man". Besides being of interest in relation to the humoral doctrine, the preceding quotation from the Nonne Preeste's tale throws some light on the prominent part played by the Herbal in Medieval healing.

The following excerpts from the Squire's Tale also refer to the humors and to herbs.

> "In Aries, the colerik hote signe (line 51)
>
> . . . . . .
>
> And every gras that groweth up on roote
> She shal eek knowe, and whome it wol do boote,
> Al be his woundes never so depe and wyde. (153-155)
>
> . . . . . .
>
> And herbes shal I right y-nowe y-finde
> To heele with your hurtes hastily. (470-71)
>
> . . . . . .

*Translated by Sir John Harington (1561-1612) as follows:

> Use three Physicians still; first Doctor Quiet,
> Next Doctor Merry-man, and Doctor Dyet.

Now can nat Canacee but herbes delve
Out of the grounde, and make salves newe
Of herbes precious, and fyne of hewe
To heelen with this hawke. . . ." (638-41)

—Squire's Tale 51, 153-155 470-71, 638-41.

It might not be amiss at this point to introduce a passage from the Prologue which brings home in a forceful manner the list of caustic substances used for skin diseases. In his description of the Somnour, Chaucer says,—

"Of his visage children were aferd.
Ther nas quick-silver, litarge, ne brimstoon,
Boras, ceruce, ne oille of tartre noon,
Ne oynement that wolde clense and byte,
That him mighte helpen of his whelkes whyte,
Nor of the knobbes sitting on his chekes."

—Prologue 628-633.

From the viewpoint of the sanitarian the passage,—

"She rente it all to cloutes atte laste,
And in the privee softely it caste."

—Merchant's Tale 1953-54

should be of interest. It will be seen that the lineage of the common privy from ancient times was not broken in the Dark Ages.

A passage in the Pardoner's Tale probably refers to the Black Death of the middle of the XIV century.

"Ther came a privee theef, man clepeth Deeth
. . . . . .
He hath a thousand slayn this pestilence."

—Pardoner's Tale 675-79.

It is surprising to find in the Cook's Prologue, line 4352, a conception associating flies with filth.

"Of many a pilgrim hastow Cristes curs,
. . . . . .
For in thy shoppe is many a flye loos."

In the Parson's Tale, line 243, there appears the following,—

"For certes, thing that never hadde lyf may never quikkene."

Is it possible that we have here an idea thought by many to be peculiarly modern,—the idea expressed by Virchow "omnis cellula e cellula"? While it may not be altogether justified to consider this passage apart from its context, the quotation would seem to indicate that Chaucer did not believe in spontaneous generation,—a question that was to arouse such acrimonious debate over three centuries later.

Let us turn now from the conceptions relating to things medical to the character and personality of the practitioners,—to the physicians, surgeons, barbers, blood-letters, charlatans and mountebanks. We come first to the description of the Doctour of Phisik in the Prologue.

"With us ther was a Doctour of Phisik,
In al this world ne was ther noon him lik
To speke of phisik and of surgerye;
For he was grounded in astronomye.
He kepte his pacient a ful greet deel
In houres, by his magik naturel.
Wel koude he fortunen the ascendent
Of his images for his pacient.
He knew the cause of everich maladye,
Were it of hoot or cold, or moiste, or drye,
And where engendred, and of what humour;
He was a verray parfit practisour.
The cause y-knowe, and of his harm the roote,
Anon he yaf the seke man his boote.
Ful redy hadde he his apothecaries,
To sende him droges and his letuaries,
For ech of hem made other for to winne;
Hir frendschipe nas nat newe to biginne.
Wel knew he th'olde Esculapius,
And Deiscorides, and eek Rufus,
Old Ypocras, Haly, and Galien;
Serapion, Razis and Avicen;
Averrois, Damascien, and Constantyn;
Bernard, and Gatesden, and Gilbertyn.
Of his diete mesurable was he,
For it was of no superfluitee,
But of greet norissing and digestible.
His studie was but litel on the Bible.
In sangwin and in pers he clad was al,
Lyned with taffata and with sendal;
And yet he was but esy of dispence;
He kepte that he wan in pestilence.
For gold in phisik is a cordial,
Therefore he lovede gold in special."

—Prologue, lines 411-444.

From this passage alone, a picture of Medical Art in Chaucer's time might be drawn. The prominent place taken by astrology (astronomye) in the equipment of a competent physician; the doctrine of the four humors handed down from Empedocles; the close coöperation between the doctor and the apotheeary in swindling the patient; the thoroughly scholastic character of the physician's book-learning and the almost blind reverence for authority; the shrewd recognition by the physician that people judge largely by appearances,—therefore his attention to fine robes; and last, but by no means least, the Doctor's frugality and love for gold,—all these traits Chaucer sketches, at times with biting satire. It is generally believed that John of Gaddesden was the original for this portrait. However, since this worthy practitioner died in 1361, and it was not until over twenty-five years later that Chaucer is thought to have written the Canterbury Tales, it is quite probable that the description of the Doctour of Phisik is rather a composite picture of many medieval physicians, than that of any one individual.

Garrison says, "The general practice of surgery, including most of the major operations, was, in the end, relegated to barbers, bath-keepers, sow-gelders and wayfaring mountebanks." Just exactly to which category we must reckon the Oxford scholar referred to in the Miller's tale, is not clear.

". . . . ther was dwellinge a povre scoler,
Had lerned art, but al his fantasye

Was turned for to lerne astrologye,
And coude a certeyn of conclusiouns,
To demen by interrogaciouns,
If that men axed him in certein houres,
Whan that men sholde have droghte or elles shoures,
Or if men axed him what sholde bifalle
Of every thing, I may nat rekene hem alle."

—Miller's Tale 1. 3191-3198

According to the Miller this scholar could "laten blood and clippe and shave" (line 3326). From the rest of the tale, the indication would be that he probably belongs among the mountebanks, by the way he dupes the simple carpenter.

Another aspect of the surgeon's craft is revealed to us in Melibeus' tale.

"A surgien, by licence and assent of swiche as weren wyse, up roos and unto Melibeus seyde as ye may heere.

"'Sir,' quod he, 'as to us surgiens aperteneth, that we do to every wighte the beste that we can, wher-as we been withholde, and to our pacients that we do no damage; wherfore it happeneth, many a tyme and ofte, that whan twey men han everich wounded other, oon same surgien heeleth hem bothe; wherfore un-to our art it is nat pertinent to norice werre, ne parties to supporte. But certes, as to the warrisshinge of your doghter, al-be-it so that she perilously be wounded, we shullen do so ententif bisinesse fro day to night, that with the grace of God she shal be hool and sound as soon as is possible.' "

—Melibeus tale, 1. 2200-2205

Here we see the surgeon as rather a learned man, one who has had a certain amount of education, and has been approved by "swiche as weren wyse". From his speech we recognize a sincere practitioner who honestly endeavors to help those whom he can. In contrast to the clear and unequivocal advice of the surgeon, we have the physicians' rather oracular "That, right as maladyes been cured by hir contraries, right so shul men warisshe werre by vengeaunce,"—over the exact meaning of which Melibeus and Prudence dispute (Lines 2465-2480, Melibeus tale), whereas they seem to be quite clear on the surgeon's words (lines 2457-62).

Over and against the physician on the one hand the surgeon on the other, we have the alchemists, magicians, and the many others who were the forefathers of our side-show medicine-men. One whole tale in Chaucer's major work is devoted to a description of one of these alchemist-magicians,—this is the Chanon Yeoman's tale. Although we are not told of any direct medical activity of the worthy Yeoman's master, we may be sure that he had more or less of an effect on the healing art of his time. His was looked upon by many as the "science" that was basic to medicine. "If the modern reader, with his mind centered on 'truths' about molecules, and electrons, and leucocytes, and relativity, and bacteria,—is to secure the full flavor of Chaucer's work he must reconstruct, or at least have sketched for him, whole systems of these despised pseudo-sciences." (Curry.)

Medicine has always swung from the one extreme of blind faith in the supernatural,—fertile ground for the charlatan,—to the other extreme of cold, factual, agnostic science,—which also may find the charlatan among its fruits. There has always been this duality of appeal,—spiritual and emotional on the one hand, rational and intellectual on the other. We are prone to think of the Middle Ages and the early Renaissance as being almost wholly colored by the former, devoid of rational approach. And yet there was a Roger Bacon, there was an Albertus Magnus and there were the young Universities throughout Europe,—"these new thinking-shops", as Dr. Coulton calls them. Chaucer had been a craftsman in several of these shops. And of all the tools he learned to use, accurate observation was the most valuable. As an example of this let me cite from his description of the Pardoner these few lines,—

A voys he hadde as smal as hath a goot.
No berd hadde he, ne never sholde have,
As smothe it was as it were late y-shave;
I trow he were a gelding or a mare.

—Prologue 1. 688-91.

Is not this almost a classic description of the eunuch? It may seem rather far-fetched to make of our good Geoffrey a bit of a scientist. But is not the faculty of accurate observation the fundamental trait of a true scientist? Do we not consider impartiality, tolerance and common sense essential in the scientific approach? Throughout his writings Chaucer observes accurately, weighs impartially, criticizes with tolerance and proposes with common sense.

Let us then take leave of our good poet, regretfully, to be sure, but with the hope that upon meeting him again we may find new delights for the historically-minded physician.

REFERENCES

Skeat, Walter W.: The Student's Chaucer. New York, Oxford University Press, 1929.

Curry, Walter Clyde: Chaucer and the Mediaeval Sciences. New York, Oxford University Press, 1926.

Garrison, Fielding: History of Medicine. Ed. 4. Philadelphia, W. B. Saunders Company.

Packard, Francis (Edited by): School of Salernum. New York, Paul B. Hoeber, Inc.

MEDICAL PROGRESS

PROGRESS IN ANESTHESIA IN 1932

BY RUSSELL F. SHELDON, M.D.†

HISTORICAL

IN 1490*, two years before Columbus made his memorable voyage, Theodoric Hugo[1], of Lucea, described a "Spongia Somnifera" which had been used by his father. This was narcosis by inhalation, as the sponge was saturated "with a strong decoction of opium, hyoscyamus, hemlock, mandragora, and unripe mulberries, mixed with the seeds of lettuce, dock and waterhemlock. These were boiled with the sponge, which, when it had absorbed the liquid, was allowed to dry. For use, the sponge was dipped in hot water for an hour, and then applied to the nostrils of the patient to be operated on, and left there until he had fallen asleep. The procedure must be deemed to have been disappointing, as it fell into disuse."

An example of this sponge was in 1932 presented to the historical section of the museum of the Royal College of Surgeons by Mr. St. J. D. Buxton, F.R.C.S. This, together with a most complete assembly of anesthetic devices of the past eighty years, had been the collection of his father, Dudley W. Buxton. In addition are letters and notes in Simpson's handwriting describing the first use of chloroform in England. Of local interest there is not only a model of Morton's "letheon" apparatus, as used October 16, 1846, but also Ehrenfried's intratracheal insufflation apparatus with its water-jacketed tubes.

1932

With all previous literature annihilated, 1932 has in itself provided the structure of a complete course in anesthesia. In English, Saklad[2] offers a most complete treatise, basing his consideration on physiology, taking the different systems of the body and showing the effects of the various anesthetics on each. The Buffalo Surgical Society conducted a Round Table Discussion on Anesthesia[3] which takes up the subject from many angles. In its issue of September 17, the *Journal of the American Medical Association* devoted its three leading articles to anesthesia, some of the points of which will be discussed later. McCuskey[4], of the Mayo Clinic, gives an excellent presentation on the choice of agent or method of anesthesia, and Beach[5], as a part of a symposium on anesthesia held at Scranton gives a comprehensive general picture. Lundy[6], however, in the already mentioned anesthesia feature number of the *J. A. M. A.* deserves, in my opinion, the honor of the best single presentation for 1932. In German, Rehn and Killian[7] have produced a masterly article.

Surveys, in greater New York by Flagg[8], and in New Jersey by Bortone[9], show that in the East at least ether is still the anesthetic most used in abdominal surgery. In Flagg's report only 45% of the cases had preliminary medication by the barbiturates or tribromethanol. It was somewhat of a surprise to find that in greater New York 90% of the cases had general, and 10% spinal. Of the general cases ether was used in 80%, nitrous oxide in 15% and ethylene in 5%.

AVERTIN

One of the greatest boosts given to any anesthetic agent in recent times was provided by the publicity given to Mr. Henry Ford's operation under avertin and ethylene.* The use of the latter agent as supplementary was somewhat soft-pedalled, but as to the former, the Winthrop Chemical Company took full advantage of the prestige so produced. Patients in my own practice were definitely pleased to know that they were receiving the same anesthetic agent as given to Mr. Ford. Didn't all the papers say how well he got along?

A great deal has been learned about avertin, but there is still some disagreement as to its toxic action. Bourne[10] states, "There are no contraindications to the use of this bromine substitution product of ethyl alcohol, provided that its dose is calculated to suit the case." Balaam[11] states, "I have at various times administered and operated under 1- rectal oil and ether; 2- intratracheal ether; 3- gas-oxygen; 4- ethylene; 5- ether; 6- chloroform and choloroform ether mixtures. From this experience I conclude that 1- Avertin is as far ahead of these as a motor car is ahead of a bicycle, from the point of view of the surgeon, anesthetist, patient and nursing sisters; and 2- No patient need be refused its benefits. Peterson and Pierce[12] say, "(It) irritates none of the body organs either in the process of its administration or in its elimination."

Some of the authors in German, however, are not so optimistic: Takane[13] from Japan, says "Avertin ist als Lebergift zu erkennen," which I understand to mean, "Avertin is recognized

*The earliest reference to anesthesia is Gen. II, 21.

†Sheldon—Assistant Anesthetist, Massachusetts General Hospital and Massachusetts Eye and Ear Infirmary. For record and address of author see "This Week's Issue," page 1384.

*See Queries and Minor Notes, J. A. M. A. 100: 443 (Feb. 11) 1933.

as a liver poison." Ruge[14] reports a fatal case of his own (dose 125 mg. per kilo), and cites five others from the literature, in all of which fatty infiltration of the liver (and kidney) was found postmortem. He believes this pathological picture to be certain proof of avertin poisoning, and in its absence questions the rôle of avertin as the cause of death. Schönbauer and Links[15] also report an avertin death in which fatty infiltration involved not only the liver and kidney, but also the heart.

That avertin has been given without untoward effect with damaged liver function is shown by Ashworth[16], who reports three cases. In spite of his own and reported cases however, Ruge[14] believes that fatal avertin injury to a *previously healthy* liver is extremely rare; according to him about one in 10,000 cases. That it is *always* safe to use avertin in cases with damaged liver function I do not believe has been proved. In the words of Ruge[14], "The high value of Avertin Narcosis will not be lessened by the reporting of cases of death following its use." An appeal is also made by the Editor[17] of the *Medical Journal of Australia* for the reporting of such cases. In the paucity of reports on fatalities from avertin it is fallacious to assume that they may not occur.

A multitude of studies on liver function has been undertaken, all of which are of interest to the anesthetist in his desire to know more about avertin metabolism in normal and diseased organs. Worthy of mention are those of Snell[18], Bourne[19], Robertson et al[20], Schutz et al[21], and Rowe[22].

Kulchar[23] reports a case of dermatitis in an anesthetist (nurse) due to avertin, which, however, was remedied by the use of gloves. But for its action on the patient, the outstanding articles are those of Raginsky and Bourne[24], Sebening[25], Widenhorn[26], and regarding the fall in the blood pressure, Taylor and Lund[27].

In German, Fuss and Derra[28] have an illuminating article based on experiments on the dog, showing the influence of oxygen and carbon dioxide inhalations on the disturbance of the carbohydrate and acid-base metabolism with avertin narcosis.

PREMEDICATION

Further studies on drugs, old and new, and their effect prior to surgery have been made. Of special interest are those of Lundy[29], Barlow[30], Barlow[31], and Barlow and Stormont[32]. In the opinion of Barlow scopolamine diminishes the effect of morphine. "The toxic effect of large doses of scopolamine on the respiratory centre are additive to those of morphine. In the rat therefore scopolamine is of no pre-anesthetic medicative value." Since in man scopolamine is presumed to act on the higher centers, this conclusion may not be significant. Of the other drugs morphine is of most value, pantopon next. Alvarez[33] has the best English article on the new product, dilaudid.

Of the non-narcotics, the barbiturates are enjoying increasing popularity. But in most hands they have not entirely displaced the opiates. Those most frequently mentioned are sodium amytal and nembutal.

SPINAL

1—*Drugs*

The obituary of spinocaine was pronounced by Leake[34], who warns against the use of that "irrational mixture of procaine, starch, and strychnine," proposed for "controlled spinal anesthesia," and exploited under the trade-marked name of "Spinocaine." Arnheim and Mage[35] with 120 cases recommend *nupercaine* for operations of long duration. Marvin[36] reports a series of 100 cases with *pantocaine* from which he concludes that this is a safe and satisfactory drug to use in spinal anesthesia, producing a long and lasting anesthesia for operations which require 1-2 hours. Woodbridge[37], with a report of 43 spinal anesthesias of his own and 5 from other sources, with an additional 100 not reported, feels that *neothesin* combines satisfactorily the qualities of duration and safety. Wülfing[38] cites Kiese with seven unfavorable results with pantocaine, and puts forward *Panthesin* as the long-looked-for substitute for novocaine. One of its advantages is that it is cheaper than novocaine. de Jonge-Cohen[39] describes the use of panthesin in dentistry.

But, by and large, novocaine (neocaine, procaine) is still the drug of choice for most cases of spinal anesthesia.

2—*Action*

Essex and Lundy[40] continue their study of problems connected with the use of spinal anesthesia and consider vasodepression, respiratory failure and too short anesthesia. The first is overcome by ephedrine. For the second, they state, "Respiratory failure, which is an occasional untoward result, should not be viewed with alarm, since it is readily overcome by early adequate artificial pulmonary ventilation." Elsewhere, Lundy[41] describes a new apparatus, manufactured by Heidbrink, for this purpose, which eliminates many difficulties of the more cumbersome Drinker respirator. For the third point, he recommends the consideration of pantocaine.

Seevers and Waters[42] continue their studies reported in 1931, and publish them in the previously mentioned anesthesia number of the *Journal of the American Medical Association*. They say, "The conditions that exist during spinal anesthesia deviate markedly from the normal. . . . The integrity of the medullary centers and heart is dependent on an adequate supply of oxygen. The additional anoxemia

accompanying partial or complete thoracic paralysis may spell disaster.

"The origin of shock in spinal anesthesia is initially entirely neurogenic. Many clinicians have compared the cases of spinal anesthesia with a blood pressure so low as to be barely recordable with the cases of shock following hemorrhage and wondered why the same type of resuscitory measures revived the former and failed in the latter. We must seek the answer in the knowledge that a diminution of total circulating blood volume with a loss of the integrity of the vessel walls as regards fluids and blood proteins occurs in hematogenic shock. It becomes apparent that this condition does not exist in the average case of spinal anesthesia. That prolonged spinal anesthesia may cause such a result, and that it may be superimposed on spinal anesthesia, are well known.

"Experimentally, the efficiency of respiration, thoracic excursion, and minute volume exchange decreases in blocks involving the thoracic region. This decrease is proportional to the height of the block. . . . The saturation of arterial blood varies directly as the circulating volume passing the pulmonary epithelium. Thus, a greater undersaturation of arterial and venous blood and a decrease in total oxygen consumption indicate a diminished volume flow of blood. . . . Exposure of the epithelium of the lungs to high concentrations of oxygen markedly augments the beneficial effects of artificial respiration.

"It seems reasonable that every patient under spinal anesthesia should be given the benefits of inhalation of oxygen. . . . From observation on dogs the simultaneous administration of carbon dioxide in the cases of impending respiratory paralysis secondary to low blood pressure is of no benefit. On the contrary a lowering of blood pressure occurs. Since the central stimulant action of carbon dioxide depends on a fair oxygenation of the medullary centers, and its effectiveness on intact vaso-constrictor pathways, these results might be expected in high blocks. Apparently a concentration of carbon dioxide that will stimulate the depressed respiratory or vasoconstrictor centers cannot be reached without exerting a predominant paralytic effect on the peripheral blood vessels.

"The continued use of ephedrine is warranted.

"Increase in the total volume of circulating blood is valuable while the vessels are still physiologically intact.

"The rational use of spinal anesthesia with maximum safety to the patient implies the following:

1. Proper selection of risks, the deciding factors for its use being the absolute need of complete muscular relaxation, and the ability of that particular patient to oxygenate his tissues normally.

2. Limitation of the block to exclude major thoracic involvement.

3. To combat cardiovascular collapse by the judicious use of the following:—

a. Inhalation of oxygen throughout the surgical procedure.

b. The prophylactic or therapeutic use of ephedrine.

c. The use of a moderate Trendelenburg position when indicated, and

d. The proper administration of fluid while the blood vessels and heart still maintain their physiological integrity.

"We do not intend to imply that in every case in which spinal anesthesia is used, the patient needs or should have all this treatment."

4. Artificial respiration with undiluted oxygen in impending circulatory or respiratory failure.

5. Postoperative hyper-ventilation with carbon dioxide throughout the first 24 hours to expand atelectatic portions of the lungs.

Cotui and Standard[43] report further experimental work. They show that procaine through direct action on the medulla produces respiratory and vasomotor paralysis when injected in sufficient quantity into the cisterna magna. When complete paralysis occurs, artificial respiration and the intravenous injection of ephedrine are effective as means of resuscitation. In sodium amytal and in combination morphine-scopolamine sodium amytal narcosis there is a lowered resistance of the centers to the paralysing effects of procaine.

From Muscat, Arabia, Harrison and Frank[44] contribute the following, based on work on cats. "Freedom from respiratory paralysis in spinal anesthesias that involve the cervical region must be due to some factors that protect the anterior roots from contact with the anesthetic solution. In the cat these factors are capricious and uncertain in their action."

Ferguson and North[45], with experimental work on dogs carry out further studies, and Bower, Clark, Wagoner and Burns[46] conclude somewhat similarly. The latter say, "There is no known method of absolutely preventing deaths from spinal anesthesia, but artificial respiration offers the best means of combating respiratory embarrassment and the fall in arterial pressure. Safe anesthesia is the preservation of epicritic and proto-pathic sensation about the level of the 6th rib. Above this, cardiac and respiratory embarrassment may develop."

Nowak[47] seeks to correlate some of these various views, and by experimental work on the cat, advances the view that venous absorption of novocaine from the spinal fluid adequately explains the various phenomena. He corroborates this by the recovery of novocaine in the urine. "Presence of novocaine in the blood stream ac-

counts for the depressor reaction by its direct action on the heart muscles, and for the respiratory disturbances by action on the medullary center."

3—*Toxicity*

Sullivan[48], shows the harmlessness of frequently repeated spinal anesthesias in the same patient, citing a case which received it 5 times in 38 hours.

Lindemulder[49], in a neurologic study of 11 cases with 2 deaths, in which spinal was used for prostatic surgery, finds a "definite toxic action on the spinal cord and the spinal nerve roots which shows its effect both clinically and pathologically."

Michelsen[50] reports five cases of severe cord injury with fibrosis and no spinal fluid occurring two months to two years after spinal anesthesia. In one case a ten year symptomless interval occurred before recurrence. He recommends a complete neurological study, both of the patient and the spinal fluid, before every prospective spinal anesthesia, and the use of some other method of anesthesia in these cases which show deviation from the normal, or in those individuals, who shortly prior to operation, have had grippe, diarrhea, typhus, or furunculosis, or who suffer from rheumatism, tuberculosis or syphilis; conditions which in themselves may predispose to spinal meningitis.

To forestall a condition which must be exceedingly rare, these recommendations are not likely to be taken seriously.

Bieter, Harvey and Burgess[51] by a direct method of testing, involving no trauma, classify by the therapeutic coefficient, or M.L.D./M.A.D. ratio, the various drugs used in local and spinal anesthesia. According to their results the values found are as follows: nupercaine 1.1; pantocaine, 4.4; novocaine, 4.88; neothesin, 5.0 and tutococaine, 13.3.

To *Surgery, Gynecology and Obstetrics* goes the palm for the joke article of 1932. To quote, "Each failure to determine the proper dose to secure the required depth of anesthesia or the desired upward extension is unqualifiedly the fault of the anesthetist." The fact that 700 cases are reported gives the article a semblance of reality, but I am sure no American surgeon or anesthetist would seriously consider the use of this forcible upward or downward injection of percaine (nupercaine) solution into a spinal canal from which 30 or so cc. of spinal fluid had been withdrawn and replaced by air. In conjunction with this spinal anesthesia the author uses a high pressure automaton for vagus and sympathetic paralysis.

LOCAL

For traumatic and fracture surgery pleas for the use of *local* anesthesia are made by Willcutts[53], Newell[54], Walker[55], and Miller[56].

TECHNIQUE

An excellent illustrated article on the effect of posture during anesthesia is presented by Dutton[57]. Hamilton and Morgan[58] also show the relation of posture to vital capacity. Poe[59] gives a pointer in the technique of mastoid anesthesia by the use of palpation instead of vision to detect contractions of the buccinator muscle, showing stimulation of the facial nerve. An excellent presentation of the value and use of intratracheal methods is given by Flagg[60], and Waters'[61] description of the carbon dioxide absorption technique is repeated for 1932 in Current Researches. Stegemann[62] is enthusiastic over the use of Narcylen (acetylene), especially in thoracic surgery. He reports 94 cases of its use in thoracoplasties. Gale and Waters[63] describe the closed endobronchial technique, which also is specially indicated in thoracic surgery.

THEORY

Studies in respiration, gas exchange, intrapulmonary pressure, and other problems concerning inhalation anesthesia are reported by Henderson and Radloff[64], McClure[65] and Brill, Prinzmetal and Brunn[66].

TOXICOLOGY—IMPURITIES

The Food and Drug Administration, United States Department of Agriculture, keeps up its investigation of the purity of anesthetic agents, and reports several instances of "Notices of Judgment" against manufacturers for "adulteration and misbranding" of ether. It would appear therefore that hospitals should continue to follow the method of Rowe and test all lots of ether before allowing its use for anesthesia.

THERAPEUTIC USE

As a protest against the continued practice of inhalation therapy by fire departments and other non-medical personnel, Flagg[69] states that there are now available to the medical profession suitable technique and armamentarium for handling this work, and that the present situation is a reproach to every practitioner of medicine. From personal observation the fire department personnel is not keen to practise medicine, and much prefers "smoke eating", to the atmosphere of the sick room.

The use of anesthetic agents and methods in other fields of medicine is vast, for diagnosis, prognosis and treatment.

White[70] says, "It is no longer necessary to do experimental sympathetic surgery." As a very necessary preliminary to sympathetic nervous system surgery he emphasizes the value of anesthesia, both local and spinal. Solomon and Epstein[71] and Epstein and Marvin[72], show the application of anesthetic agents and methods in psychiatry. Telford and Stopford[73], show the

value of spinal anesthesia in the prognosis of vasospastic disease of the lower limbs.

In treatment, of course, the use of agents and methods are legion. Potenciano[74], makes a statement which hardly coincides with the ideas of most American anesthetists, namely that ether has a soothing action on the peritoneum, and is therefore useful locally as a powerful bactericide. Outside of the peritoneum, this use of ether is not uncommon.

The inhalation of oxygen, already shown to be beneficial in many conditions, has been checked up, especially in relation to heart disease, by Hamburger, Katz, Cohn and Rubinfeld[75], but for a thorough and painstaking study on oxygen therapy in general, Boothby's[76] article is outstanding. Saklad[77] also gives an eminently practical summary of work to date on therapy, not only with oxygen, but also with carbon dioxide. An ingenious new method, applying Miller's gravitational idea, for oxygen therapy is described by Burgess and Burgess[78], and its practical use emphasized. Lund[79] describes a "simple" method of administering approximately accurate mixtures of oxygen and carbon dioxide for use when anesthesia machines are not available. Henderson[80] adds pertussis to the list of diseases in which carbon dioxide therapy may be advantageous. Renton[81] and Christie[82] also add to our knowledge of carbon dioxide inhalation therapy, in, and out of, the operating room. The relief of the gastric crises of tabes dorsalis by spinal anesthesia is described by Kamman[83], but of far-reaching importance is the blocking of pain pathways for relief of suffering of more permanent character. Thus White[84] describes the relief of painful aneurysm of the aortic arch by the paravertebral injection of procaine and alcohol. Miller[85], discusses the value of epidural block in sciatica.

Dogliotti[86], inadvertently omitted in the 1931 progress report[87], has an excellent article on the relief of painful syndromes by direct subarachnoid alcoholisation.

POSTOPERATIVE COMPLICATIONS

With a study of 812 cases in San Francisco, Brown and Debenham[88] find about four times as many pulmonary complications following spinal as inhalation anesthesia, even though the bad risks had inhalation. Sise[89] in Boston, and Lyons[90] in New York, the latter with 6619 cases, do not find any such preponderance and in general agree with King that the type of operation is more a factor than the anesthesia.

OBSTETRICAL ANESTHESIA

Ruth[91] and Rosenfield and Davidoff[92] describe the use of the barbiturates in obstetrics. Dodek[93], in a complete thesis, contributes a real advance in the study of the mechanism of labor and the influence of various drugs on its course.

TEACHING

Cutler[94] states, "I have long been convinced that the teaching of anesthesia is not well done anywhere in the United States." As a matter of fact it is taught at all only in a very few schools[95]. If competition is the life of trade, opening up of anesthesia departments in a few more schools might raise the standards of all. Dental schools show the same lack of instruction[96]. Flagg[8] emphasizes this lack, but his appeals apparently fall on deaf ears.

FUTURE

"I believe that we must all be prepared to make larger expenditures for anesthesia in the future than we have in the past. The field of anesthesia has widened and is constantly widening. . . . Today one of the very valuable functions of anesthetists is the selection of the type of anesthesia for a given case. . . . Expertness of the grade necessary for the employment of various types of highly refined anesthesia will, of necessity, command salaries of considerable size, and I would therefore call your attention to the fact that sometime within the fairly near future, the problem of full time position anesthetists commanding fairly high salaries must be met by hospital trustees and surgeons if they wish to keep their surgery up to the standard of progress"[97].

A consummation of this ideal, plus the teaching of students and internes, would place the anesthetist in a position really to advance anesthesia.

The centenary of Morton's demonstration occurs October 16, 1946. Now is none too early to start to restore by this date the Massachusetts General Hospital to its place as the source of advances in anesthesia. Is not this an ideal worthy of attainment?

REFERENCES

1 The history of anesthesia: a valuable exhibition. Lancet. 2: 201 (July 23) 1932.
2 Saklad, M.: The present day status of anesthetic agents. Am. J. Surg. 16: 451 (June) 1932.
3 Anesthesia. A round table discussion. New York M. J. 32: 125 (Feb. 1) 1932.
4 McCuskey, C. F.: The selection of the anesthetic agent or method. New Orleans M. & S. J. 85: 1 (July) 1932.
5 Beach, E. W.: Present day anesthesia. Penn. M. J. 35: 246 (Jan.) 1932.
6 Lundy, J. S.: Advances in anesthesia from the standpoint of the anesthetist. J. A. M. A. 99: 968 (Sept. 17) 1932.
7 Rehn, E., and Killian, H.: Eine kritische Uebersicht über unsere Narkoseverfahren. München. med. Wchnschr. 79: 1646 (Oct. 7) 1932, and 79: 1665 (Oct. 14) 1932.
8 Flagg, P. J.: Editorial. Am. J. Surg. 16: 535 (June) 1932.
9 Bortone, F.: Anesthesias administered in the hospitals of the state of New Jersey. A survey. Anesth. & Analg. 11: 256 (Nov.-Dec.) 1932.
10 Bourne, W.: The present status of avertin in anesthesia. Canad. M. A. J. 27: 515 (Nov.) 1932.
11 Balaam, E. M.: Correspondence. M. J. Australia. 1: 812 (June 4) 1932.
12 Peterson, R., and Pierce, J. M.: Avertin in gynecology. Surg. Gynec. Obst. 55: 191 (Aug.) 1932.
13 Takane, S.: Über den Einfluss verschiedener Narkosemittel auf die Leberfunktion. Experimentelle Untersuchungen mit Bilirubin und Kongorot. Arch. f. klin. Chir. 170: 672, 1932.
14 Ruge, E.: Tödliche Leber-Nierenschädigung nach Avertin? Zentralbl. f. Chir. 59: 2334 (Sept. 24) 1932.

15 Schönbauer, L., and Links, R.: Über chemische Befunde in den Organen nach einem Todesfall nach Avertinbasisnarkose. Zentralbl. f. Chir. 59: 941 (Apr. 9) 1932.
16 Ashworth, H. K.: The use of avertin in the presence of damaged liver function. Brit. M. J. 1: 1123 (June 18) 1932.
17 Editorial: M. J. Australia. 1: 741 (May 21) 1932.
18 Snell, A. M.: Clinical varieties of intrahepatic jaundice. Proc. Staff Mayo Clinic. 7: 731 (Dec. 21) 1932.
19 Bourne, W.: The effects of anesthetics on the liver. Brit. M. J. 2: 706 (Oct. 15) 1932.
20 Robertson, W. E.; Swalm, W. A., and Konzelmann, F. W.: Functional capacity of the liver. Comparative merits of the five most popular tests. J. A. M. A. 99: 2071 (Dec. 17) 1932.
21 Schutz, C. B.; Helwig, F. C., and Kuhn, H. P.: A contribution to the study of so-called liver death. J. A. M. A. 99: 633 (Aug. 20) 1932.
22 Rowe, A. W.: The toxemias of pregnancy. Some observations on the hepatic factor. J. A. M. A. 99: 2083 (Dec. 17) 1932.
23 Kulchar, G. V.: Contact dermatitis in anesthetist due to "avertin". J. A. M. A. 99: 560 (Aug. 13) 1932.
24 Raginsky, B. B., and Bourne, W.: On several phases of the pharmacology of avertin. Anesth. & Analg. 11: 33 (Jan.-Feb.) 1932.
25 Sebening, W.: Recent researches and clinical advances in avertin narcosis. Anesth. & Analg. 11: 145 (July-Aug.) 1932.
26 Widenhorn, H.: Clinical and metabolic study of avertin basal anesthesia, with ether, nitrous oxid-oxygen and ethylene. From experience of 1500 cases. Anesth. & Analg. 11: 60 (Mar.-Apr.) 1932.
27 Taylor, G. W., and Lund, C. C.: Blood pressure fall occurring in avertin anesthesia. New Eng. J. Med. 206: 612 (Mar. 24) 1932.
28 Fuss, H., and Derra, E.: Über Störungen des Kohlehydrat- und Säurebasenhaushalts sowie des Gasaustausches bei Avertinnarkose und ihre Beeinflussung durch Sauerstoff- und Kohlensäureinhalation. Deutsche. Ztschr. f. Chir. 235: 587, 1932.
29 Lundy, J. S.: The effect of different doses of hypnotics given before anesthesia on respiration and their bearing on relaxation. S. Clin. N. Amer. 12: 1059 (Aug.) 1932.
30 Barlow, O. W.: The tranquilizing potency of morphine, pantopon, codeine, papaverine and narcotine. J. A. M. A. 99: 986 (Sept. 17) 1932.
31 Barlow, O. W.: Pre-anesthetic value of scopolamine and mixtures of scopolamine and morphine in relation to nitrous oxide anesthesia in the rat. J. Pharmacol. & Exper. Therap. 46: 131 (Oct.) 1932.
32 Barlow, O. W., and Stormont, M. F.: The premedication values of morphine, codeine, papaverine, narcotine, and pantopon in relation to nitrous oxide anesthesia. J. Pharmacol. & Exper. Therap. 46: 141 (Oct.) 1932.
33 Alvarez, W. C.: Dihydromorphinone Hydrochloride (dilaudid, Bilhuber-Knoll). A powerful analgesic with some advantages over morphine. Proc. Staff Mayo Clin. 7: 480 (Aug. 17) 1932.
34 Leake, C. D.: Irrational mixtures for spinal anesthesia and peptic ulcer. J. A. M. A. 99: 936 (Sept. 10) 1932.
35 Arnheim, E. E., and Mage, S.: Nupercaine spinal anesthesia. Surg. Gynec. Obst. 54: 826 (May) 1932.
36 Marvin, F. W.: Pantocain in spinal anesthesia. New Eng. J. Med. 207: 368 (Aug. 25) 1932.
37 Woodbridge, P. D.: Neothesin for spinal and regional anesthesia. Preliminary clinical report. Anesth. & Analg. 11: 177 (July-Aug.) 1932.
38 Wülfing, M.: Ueber "Panthesin" und andere neuere Mittel zur örtlichen Betäubung. Schmerz. Narkose. Anasthesie. 5: 64 (Nov.) 1932.
39 de Jonge-Cohen, Th. E.: Erfahrungen mit Panthesin in der Zahnheilkunde. Schmerz. Narkose. Anasthesie. 5: 77 (Nov.) 1932.
40 Essex, H. E., and Lundy, J. S.: Spinal anesthesia: Laboratory and clinical observations. S. Clin. N. Amer. 12: 1053 (Aug.) 1932.
41 Lundy, J. S.: Adequate and properly controlled artificial respiration for surgical patients by means of a new pulmonary ventilator. Proc. Staff Mayo Clinic. 7: 225 (Apr. 13) 1932.
42 Seevers, M. H., and Waters, R. M.: Respiratory and circulatory changes during spinal anesthesia. J. A. M. A. 99: 961 (Sept. 17) 1932.
43 Cotui, F. W., and Standard, S.: Experimental studies in subarachnoid anesthesia. Paralysis of vital medullary centers. Surg. Gynec. Obst. 55: 290 (Sept.) 1932.
44 Harrison, P. W., and Frank, R.: Respiratory paralysis in spinal anesthesia. Arch. Surg. 25: 571 (Sept.) 1932.
45 Ferguson, L. K., and North, J. P.: Observations in experimental spinal anesthesia. Surg. Gynec. Obst. 54: 621 (Apr.) 1932.
46 Bower, J. O.; Clark, J. H.; Wagoner, G., and Burns, J. C.: Spinal anesthesia. A summary of clinical and experimental investigations, with practical deductions. Surg. Gynec. Obst. 54: 882 (June) 1932.
47 Nowak, S. J. G.: Experimental studies in spinal anesthesia. Report of clinical meeting at Boston City Hospital, February 11, 1932. New Eng. J. Med. 206: 653 (Mar. 24) 1932.
48 Sullivan, W. M., Jr.: Observations on a patient to whom spinal anesthesia was administered five times within thirty-eight hours. J. A. M. A. 99: 993 (Sept. 17) 1932.
49 Lindemulder, F. G.: Spinal anesthesia. Its effect on the central nervous system. J. A. M. A. 99: 210 (July 16) 1932.
50 Michelsen, J.: Spätschädigungen des Rückenmarks nach Lumbalanästhesie und ihre Verhütung. München. med. Wchnschr. 79: 1148 (July 15) 1932.
51 Bieter, R. N.; Harvey, A., and Burgess, W. W.: Spinal anesthesia in summer frogs. J. Pharmacol. & Exper. Therap. 45: 291 (July) 1932.
52 Kirschner, M.: Spinal zone anesthesia, placed at will and dosage individually graded. Surg. Gynec. Obst. 55: 317 (Sept.) 1932.
53 Willcutts, M. D.: Local anesthesia as a factor in reducing the morbidity of traumatic surgery. Surg. Gynec. Obst. 54: 378 (Feb. No. 2A) 1932.
54 Newell, E. T.: Improvements in the anesthetic complex with special reference to local anesthesia in bone surgery. J. Tennessee M. A. 25: 236 (June) 1932.
55 Walker, R. H.: Reduction of fractures with local anesthetics. W. Virginia M. J. 28: 302 (July) 1932.
56 Miller, G.: Use of local anesthesia in treatment of fractures. Canad. M. A. J. 27: 260 (Sept.) 1932.
57 Dutton, A. C.: Posture during anesthesia—its effect. California & West. Med. 37: 145 (Sept.) 1932.
58 Hamilton, W. F., and Morgan, A. B.: Mechanism of the postural reduction in vital capacity in relation to orthopnoea and storage of blood in the lungs. Am. J. Physiol. 99: 526 (Feb.) 1932.
59 Poe, J. G.: Injury to facial nerve in mastoid operations. J. A. M. A. 99: 673 (Aug. 20) 1932.
60 Flagg, P. J.: Intratracheal inhalation anesthesia in practice. Arch. Otolaryng. 15: 844 (June) 1932.
61 Waters, R. M.: Carbon dioxid absorption from anesthetic mixtures. Anesth. & Analg. 11: 97 (May-June) 1932.
62 Stegemann, H.: Die Narzylenbetäubung bei der Operation Lungenkranke, insbesonders bei der Thorakoplastik. Schmerz. Narkose. Anasthesie. 5: 49 (Nov.) 1932.
63 Gale, J. W., and Waters, R. M.: Closed endobronchial anesthesia for thoracic surgery. Preliminary report. Anesth. & Analg. 11: 283 (Nov.-Dec.) 1932.
64 Henderson, Y., and Radloff, E. M.: The chemical control of breathing, as shown in the acid base balance of the blood, under progressive decrease of oxygen. Am. J. Physiol. 101: 647 (Sept.) 1932.
65 McClure, G. S.: An accessory regulation of acid-base equilibrium, and pulmonary ventilation by virtue of lactic acid changes in the liver. Am. J. Physiol. 99: 365 (Jan.) 1932.
66 Brill, S.; Prinzmetal, M., and Brunn, H.: Factors alternating intrapleural pressure and their clinical significance. J. Thoracic Surg. 1: 243 (Feb.) 1932.
67 Reports of Food and Drug Administration. U. S. Dept. of Agriculture. J. A. M. A. 98: 2305 (June 25) 1932.
68 Reports of Food and Drug Administration. U. S. Dept. of Agriculture. J. A. M. A. 99: 1012 (Sept. 17) 1932.
69 Flagg, P. J.: Asphyxial death. A professional disgrace. Am. J. Surg. 18: 542 (Dec.) 1932.
70 White, J. C.: Progress in the surgery of the sympathetic nervous system in 1931. New Eng. J. Med. 207: 788 (Nov. 3) 1932.
71 Solomon, H. C., and Epstein, S. H.: Encephalography under narcosis produced by nonvolatile anesthetics. A note on the technic. J. A. M. A. 98: 1794 (May 21) 1932.
72 Epstein, S. H., and Marvin, F. W.: Observations on pentobarbital-sodium in lumbar punctures, convulsive and manic states. New Eng. J. Med. 207: 258 (Aug. 11) 1932.
73 Telford, E. D., and Stopford, J. S. B.: The prognostic value of spinal anesthesia in vasospastic diseases of the lower limbs. Brit. M. J. 1: 1116 (June 18) 1932.
74 Potenciano, P. G.: Ether in abdominal surgery. M. J. & Record. 136: 227 (Sept. 21) 1932.
75 Hamburger, W. W.; Katz, L. N.; Cohn, D. J., and Rubinfeld, S. H.: Observations on the effects of oxygen therapy. Clinical observations in heart disease. J. A. M. A. 98: 1779 (May 21) 1932.
76 Boothby, W. M.: Oxygen therapy. J. A. M. A. 99: 2026 (Dec. 10) 1932 and 99: 2166 (Dec. 17) 1932.
77 Saklad, M.: Oxygen and carbon dioxide therapy. New Eng. J. Med. 207: 1132 (Dec. 22) 1932.
78 Burgess, A. M., and Burgess, A. M. Jr.: A new method of administering oxygen. A preliminary note. New Eng. J. Med. 207: 1078 (Dec. 15) 1932.
79 Lund, C. C.: A simple method of administering approximately accurate mixtures of oxygen and carbon dioxide. New Eng. J. Med. 207: 829 (Nov. 10) 1932.
80 Henderson, Y.: Inhalation of carbon dioxide in the paroxysmal stage of pertussis. J. A. M. A. 99: 654 (Aug. 20) 1932.
81 Renton, D. J.: Carbon dioxide: some observations on its use and abuse during anesthesia. M. J. Australia. 1: 121 (Jan. 23) 1932.
82 Christie, R. V.: Therapeutic use of carbon dioxide. Canad. M. A. J. 27: 289 (Sept.) 1932.
83 Kamman, G. R.: The use of spinal anesthesia in gastric crises in tabes dorsalis. Minnesota Med. 15: 845 (Dec.) 1932.
84 White, J. C.: Painful aneurysms of the aortic arch. Relief by paravertebral injections of procaine and alcohol. J. A. M. A. 99: 10 (July 2) 1932.
85 Miller, L. F.: Value of epidural block in sciatica. M. J. & Record. 135: 221 (Mar. 2) 1932.

86 Dogliotti, A. M.: Traitement des Syndromes Douloureux de la périphérie par l'Alcoolisation Sub-arachnoïdienne des Racines Postérieures à leur Émergence de la Moelle Epinière. Presse méd. 39: 1249 (Aug. 22) 1931.

87 Sheldon, R. F.: Progress in Anesthesia in 1931. New Eng. J. Med. 207: 620 (Oct. 9) 1932.

88 Brown, A. L., and Debenham, M. W.: Postoperative pulmonary complications. A study of their incidence following inhalation and spinal anesthesia. J. A. M. A. 99: 209 (July 16) 1932.

89 Sise, L. F.: Postoperative pulmonary complications: with special reference to the effect of spinal anesthesia. Anesth. & Analg. 11: 23 (Jan.-Feb.) 1932.

90 Lyons, M.: Respiratory complications following general anesthesia. Surg. Gynec. Obst. 55: 162 (Aug.) 1932.

91 Ruth, H. S.: Obstetrical analgesia and anesthesia with sodium isoamylethyl barbiturate and nitrous oxid-oxygen. Anesth. & Analg. 11: 111 (May-June) 1932.

92 Rosenfield, H. H., and Davidoff, R. B.: A new procedure for obstetrical analgesia. New Eng. J. Med. 207: 366 (Aug. 25) 1932.

93 Dodek, S. M.: A new method for graphically recording the contractions of the parturient human uterus. A study of the effects of certain sedatives, anesthetics, and stimulants upon the uterus in labor. Surg. Gynec. Obst. 55: 45 (July) 1932.

94 Cutler, E. C.: Report on undergraduate teaching of surgery. New Eng. J. Med. 207: 1182 (Dec. 29) 1932.

95 Book Reviews: New Eng. J. Med. 206: 1380 (June 30) 1932.

96 Conner, T.: Status of present day instruction in general anesthesia. J. Am. Dental A. 19: 1931 (Nov.) 1932.

97 Lahey, F. H.: Some remarks on medical economics. New Eng. J. Med. 207: 725 (Oct. 27) 1932.

PRESENTATION OF THE LESLIE DANA MEDAL

The Leslie Dana Gold Medal, awarded annually for the most outstanding achievements in the prevention of blindness and the conservation of vision, was presented in St. Louis, Mo., June 19, to Dr. William H. Luedde, director of the department of ophthalmology in the St. Louis University School of Medicine. The medal is one of the most highly prized marks of recognition in the entire public health field.

Dr. Luedde was selected for this honor by the National Society for the Prevention of Blindness in coöperation with the Missouri Association for the Blind, through which the medal is offered annually by Mr. Leslie Dana of St. Louis. The conditions of the award set forth that it is to be made for "long meritorious service for the conservation of vision in the prevention and cure of diseases dangerous to eyesight; research and instruction in ophthalmology and allied subjects; social service for the control of eye diseases; and special discoveries in the domain of general science or medicine of exceptional importance in conservation of vision".

In making the presentation, Lewis H. Carris, of New York City, managing director of the National Society for the Prevention of Blindness, said:

"Like many others, Dr. Luedde's work in the movement for the prevention of blindness began with his interest in the blind themselves. This interest has continued through his close association since the beginning with the Missouri School for the Blind and with the welfare work of the Missouri Association for the Blind and the Missouri Commission for the Blind.

"In 1913 he became director of the Prevention of Blindness Department of the Missouri Association for the Blind. There was no state appropriation for his department but his great desire to prevent blindness impelled him to reach out to help people throughout the state.

"Some years later Dr. Luedde, on account of his recognized ability and work, was appointed Director of the Prevention of Blindness Department of the newly organized State Commission for the Blind in Missouri."

A CAMPAIGN AGAINST TUBERCULOSIS

Because the fight against tuberculosis has been only partly won, an intensive campaign was inaugurated in Middlesex County, June 21, 1933.

This took the form of a meeting at the Middlesex County Sanatorium attended by more than one hundred doctors, nurses and members of boards of health.

Mr. Walter C. Wardwell, Chairman of the Board of Trustees of the Middlesex County Sanatorium, presided.

Addresses were delivered by Dr. George H. Bigelow, State Commissioner of Public Health; Miss M. Gertrude Martin, consultant in that department, and John D. Crowley, executive secretary of the Cambridge Board of Health. Following the meeting the group inspected the sanatorium as guests of Dr. Sumner H. Remick, the superintendent.

The two main issues of the campaign, according to the speakers, will be an appeal to the public for coöperation and the innovation of a system of checking up on persons exposed to the disease.

A REUNION OF TUFTS COLLEGE MEDICAL SCHOOL CLASS OF 1908

The twenty-fifth anniversary of the graduation of the 1908 class of Tufts College Medical School was held at the University Club, Boston, June 21.

Dr. Edward F. Brennan of Norwood, President of the Class, presided, and Dr. Seth F. Arnold of Belmont, who was toastmaster of the banquet 25 years ago, again officiated in this capacity. Dr. Sara A. M. Williams of Jamaica Plain representing the women members of the class was present.

Addresses were delivered by Dr. A. Warren Stearns, Dean of the School, and Dr. Timothy Leary, Medical Examiner of Suffolk County and, formerly, Professor of Pathology of the School.

CASE RECORDS
of the
MASSACHUSETTS GENERAL HOSPITAL

ANTE MORTEM AND POST MORTEM RECORDS AS USED IN WEEKLY CLINICAL-PATHOLOGIC EXERCISES

EDITED BY RICHARD C. CABOT, M.D.
F. M. PAINTER, A.B., ASSISTANT EDITOR

CASE 19261

FIFTEEN WEEKS' JAUNDICE (MOSTLY WITHOUT PAIN) IN AN OLD MAN

MEDICAL AND SURGICAL DEPARTMENTS

An American garage man fifty-seven years old entered complaining of jaundice of fifteen weeks' duration.

Two weeks before the appearance of jaundice he began to have sour eructations about two hours after meals, relieved by medicines given by his doctor. A few days after this relief jaundice was noticed and he had drowsiness, dark urine, putty colored stools, loss of weight and strength, and nausea and anorexia without vomiting. Five weeks later he had dull right upper quadrant pain for six days radiating to the right back, not severe or colicky but keeping him awake at night. After this stopped he had no pain whatever. He began to have itching, which increased and became his most distressing symptom. Five weeks before entry he went to a hospital where he was advised to have an exploratory operation, but refused. He went home and made some symptomatic improvement, stopped losing weight and had less intense jaundice. He thought his stools had become browner; he had however been taking brown pills. At one time during his illness he had three or four clay colored stools daily. He now had two a day. He urinated two or three times at night. He had lost twenty pounds since the onset. He had had no gastro-intestinal symptoms before this illness.

His family history and past history are negative.

Examination showed a poorly nourished man lying flat in bed scratching his skin, which was dark brownish yellow and showed many excoriations. The sclerae were very yellow. The heart and lungs were normal. The abdomen was very tense; examination was unsatisfactory. The liver edge was felt four fingerbreadths below the costal margin, slightly tender and possibly nodular. The spleen was not felt. Rectal examination and the extremities, pupils and reflexes were negative. The feces were clay colored.

Before operation the urine was dark brown and showed bile at all of four examinations, sugar at two; the specific gravity was 1.010 to 1.022. Blood examination showed 10,800 white cells, 87 per cent polymorphonuclears, hemoglobin 70 per cent, reds 4,800,000, slight achromia, not much variation in size and shape. A Hinton test was negative. A liver function test showed 90 per cent retention. The icteric index was 75, the van den Bergh 18.30, direct reaction, the bleeding time 3 minutes, the clotting time 11 to 33 minutes. On gastric analysis the fasting contents of the stomach showed free acid 21, combined acid 6; the test meal at half an hour, free acid 57, combined acid 5; at one hour free acid 63, combined 8. The stools before operation were clay colored or white at all of five examinations.

Before operation the temperature was 97° to 99.5°, the pulse 65 to 91, the respiration normal.

X-ray examination of the upper gastro-intestinal tract showed no evidence of organic disease. A barium enema showed a spastic type of sigmoid with no evidence of disease. The remainder of the colon was negative to the hepatic flexure, where there was a two-inch filling defect on the superior surface near the region of the gall bladder. This area showed two rugae passing through it. The size of the lesion on two examinations remained practically the same. The heart was unusually small, the aorta elongated, not dilated or tortuous. The diaphragm was low. There was evidence of old pleurisy at both apices. A plain film of the gall bladder showed no stones.

Although he considered the patient a poor risk, a surgical consultant advised operation, and the visiting physician, having obtained a history of skin discoloration before dark urine was noted, urged it. On the tenth day after admission operation was done. On the third day the patient had some bleeding from transfusion wounds and the nose. Otherwise he did well until the seventh day, when he developed a slight pleurisy which cleared in two days. On the eighth day he began to vomit and two days later was vomiting almost everything taken and had lost ground rapidly. The abdomen was very tense. On the twelfth day he became delirious and died.

CLINICAL DISCUSSION

I

DR. RICHARD C. CABOT: "An American garage man fifty-seven years old entered complaining of jaundice of fifteen weeks' duration." I think four times out of five you will be right if, with those facts and no more, you say cancer of the pancreas. That is, with an elderly man with fifteen weeks' jaundice, on the general doctrine of chances it is an obstructive jaundice, and much the commonest cause of obstruction at that age, especially when they say nothing

about pain, is cancer of the pancreas. Of course all we know positively is that biliary obstruction lasting fifteen weeks has occurred in an elderly man; we do not know the cause, we do not even know for certain that it is obstruction. Or if it is, still cancer in the bile ducts or in the liver itself may produce similar obstruction. Nevertheless your first guess on reading this line and a half should properly, I think, be cancer of the pancreas.

Two weeks earlier he had sour eructations after meals, relieved by medicines. That may well be due to whatever cause underlies his jaundice. Of course it makes us wonder whether he did not have cancer of the stomach first; but any type of disease that causes jaundice can cause stomach trouble before the jaundice appears.

Such pain as is recorded did not have the characteristics of a gallstone colic. But now he has "no pain whatever." That has been the condition for the last ten weeks.

There is nothing to point to cancer anywhere else in the intestinal tract.

Now let us read the physical examination.

II

I have nothing to add to what I said before reading the history.

Of course a nodular liver is very important if it is really there; but as they say only "possibly nodular" I think it is rash for us to draw any particular conclusions from it. We have jaundice plus an enlarged liver. The enlarged liver itself is probably due to the obstruction causing the jaundice. It is still the same essential fact. The liver is stuffed with bile that cannot get out, and it becomes enlarged. I should think we still had one fact and one fact only.

No light is thrown on the case by the blood and urine examinations.

"A liver function test showed 90 per cent retention." I do not know much about what test shows in cancer of the pancreas. Of course it shows that the liver is not functioning, but whether the test would show the same thing if the liver was not functioning because no bile could get out, or because cancer was in it, I do not know. Have you any ideas about that, Dr. Fremont-Smith?

DR. MAURICE FREMONT-SMITH: Dr. Mallory knows much more about that than I do.

DR. TRACY B. MALLORY: I do not know much either about that.

DR. CABOT: In the gastric analysis the point is: he had plenty of free acid.

Summing up thus far, we have absolute obstruction to the outflow of bile. We have no reason to suppose that the jaundice is produced in the liver. It seems to be produced outside, and we have nothing in the physical examination or elsewhere to help us to localize the obstruction. If, then, we have simply the evidence of obstruction in an old man, painless, lasting fifteen weeks, we have nothing to do but to fall back on statistics, as I have already said. Statistical probabilities with this picture point to cancer of the pancreas.

Now we come to the x-ray examination. Will you show us those films, Dr. Hampton?

DR. AUBREY O. HAMPTON: We have no film of the upper gastro-intestinal tract. They note that nothing abnormal was found. It would be interesting to know whether or not they could have found any evidence of enlargement of the pancreas. They do not mention the pancreas. The film of the gall bladder area shows no stones. The gas in the hepatic flexure is lower than usual, and the shadows above it are quite homogeneous. We do not see the liver edge. The barium enema showed a rather interesting picture. Just distal to the hepatic flexure in the region of the gall bladder there is a constant filling defect. We have no satisfactory film of that area because of the dilated gut obscuring it in all views except in a film taken after evacuation. In this film the defect has the appearance of an extrinsic mass with extension into the gut because of this saw-toothed irregularity and concave defect. I notice in the note that it was stated that two mucosal folds were seen to pass through the defect. If those are mucosal folds we can say fairly positively that the lesion does not involve all the mucosa of the gut and the chances are that it is not inside the colon at all.

Our findings point towards an extrinsic lesion which could be either inflammatory or malignant, involving the hepatic flexure.

His chest shows nothing very remarkable. We had no evidence of enlargement of the spleen. The gas bubble in the stomach and the splenic flexure of the colon are very close together and high. There is no elevation of the left diaphragm; the right is perhaps a little elevated and the dome is broader than usual. We described some apical pleurisy, and that is all in the chest.

DR. CABOT: As I understand it, the bulk of this evidence is of something pressing on the colon from outside. That might be the gall bladder. We should expect a distended gall bladder with cancer of the pancreas. Or the colon might be compressed by the pancreas itself. We had no disturbance of the function of the intestine itself, which we almost surely would have had in cancer in the gut itself. We have, then, evidence of a filling defect in the colon, but the evidence places the cause of this outside the intestine. In pancreatic cancer, if the abdomen is at all slack we often feel a very big gall bladder. In such cases it is often as big as one's fist. But here the abdomen is tense. In the pancreas itself we almost never feel a tumor. It

is too deep. If we feel anything it is usually not a tumor but a cyst. So one does not expect, even though one has made the diagnosis of pancreatic cancer, and even under favorable conditions, to feel any tumor except the distended gall bladder. Here the conditions are not favorable.

I think the decision to operate was an absolutely right judgment. I am sure that if I were this patient I should want to be explored. There have been many such cases which we thought were hopeless and incurable which have turned out post mortem not to be so; so that the patient has a right to be given any possible chance.

The fact that the skin discoloration came earlier than the urinary discoloration evidently meant something particular to the physician. I am wondering what it should mean to us. It seems as if that was one reason for urging the operation. It does not however convey anything to me. I should have said that whatever the cause of jaundice, bile usually appears in the conjunctivae first, skin next, urine next, but it may appear in all simultaneously, and the order, so far as I know, is not diagnostically helpful.

DR. MALLORY: Possibly they were thinking of hemochromatosis, but that would not be any argument for operation.

DR. CABOT: No, hardly; rather the other way.

Now we have a right to see the preoperative findings, having, I take it, all made a diagnosis of obstruction to the common duct, probably due to pancreatic cancer, possibly originating in the duct itself, or elsewhere. We are pretty sure of the obstruction. We can only reach statistical probability in relation to its cause.

PREOPERATIVE DIAGNOSIS

Obstructive jaundice and carcinoma of the pancreas.

OPERATION

A large dilated gall bladder was exposed. The obstruction was found to be due to a large growth apparently involving the head of the pancreas. The growth extended to and involved the wall of the stomach near the pyloric ring. The liver was greatly distended and overlay the gall bladder. The gall bladder was aspirated by tapping with a needle and suction and an anastomosis performed with the stomach just above the pyloric end.

PATHOLOGIC REPORT

A small piece of omental fat containing several brown spots and streaks. No diagnostic abnormality was recognized.

FURTHER DISCUSSION

DR. CABOT: I don't know just what their idea was about the fat.

DR. MALLORY: They probably thought they were picking up a little implantation of cancer, for the sake of confirming it.

DR. CABOT: Operation then confirms our expectation, except that it seems to add something we did not expect, namely involvement of the stomach. I should say that cancer of the pancreas rarely if ever involves the stomach. I do not see how an operation, without doing something dangerous to the patient, could tell us anything certain about that gastric involvement. It may be merely an adhesion to the stomach. So I do not think we ought to change our opinion or say anything in particular more than that there is a possibility of involvement of the stomach.

There is certainly nothing to regret in his death. If the operation had been wholly successful he might have lived on for a time, but with the certainty of facing death soon afterwards.

Should we add anything to what we have said? The x-ray examination of the chest is negative, the urine and blood negative, so all we can do is to make some guesses as to metastases from this cancer, if it is cancer, as we believe. This cancer oftenest metastasizes to the regional lymph nodes, and next, so far as I know, to the liver. Those are the things to keep in mind as the possibilities. The point that interests me most to know is, can we have ninety per cent retention in the liver function test without liver disease?

A STUDENT: Sugar was found twice. This is the third time I have noticed in a series of cases that with cancer of the pancreas we have found sugar in the urine.

DR. CABOT: Yes, I have also noticed that a number of times. Of course, in examinations of that kind we often get sugar, and I do not know if the proportion in pancreatic cancer is enough larger to be of any use in diagnosis of the trouble. I have seen many cases without sugar.

A STUDENT: May not that be as much a sign of liver dysfunction as of pancreatic involvement?

DR. CABOT: Yes, I think it might be. Even if the pancreas were not involved, if the liver is thrown out of function by cancer in the ducts I should think it would have the same result.

A STUDENT: How seriously would you consider carcinoma of the gall bladder?

DR. CABOT: Of course if it did not get into the ducts itself you would not have jaundice. All we can say here is obstruction of the bile duct. What is the commonest cause of such an obstruction of the bile duct? The first is cancer of the pancreas, the second cancer of the bile ducts, and after that I should say cancer

of the gall bladder itself with extension into or pressure on the ducts.

A STUDENT: How often do you get this sort of picture with metastasis to the liver from somewhere around the intestine?

DR. CABOT: First I think it would be rare to have such intense jaundice. Secondly, if it has lasted as long as fifteen weeks we should expect some sign of intestinal obstruction. We do not expect obstruction very early in intestinal cancer, but if it has been there long enough to produce metastasis then we do. So I should be very much surprised to find any disease of the intestine.

A STUDENT: Might you expect to find neoplasm of the retroperitoneal nodes?

DR. CABOT: Not with such a jaundice.

DR. FREMONT-SMITH: That film seems to show an infiltrating process in the colon.

DR. HAMPTON: This irregular shadow could be superimposed small bowel, and if so of course the colon is merely pressed upon and not invaded.

DR. CABOT: Of course they ought easily to have seen that invasion at operation if it was there. As they did not, I take it it was not there.

CLINICAL DIAGNOSES (FROM HOSPITAL RECORD)

Carcinoma of the pancreas.

DR. RICHARD C. CABOT'S DIAGNOSIS

Carcinoma of the pancreas.

ANATOMIC DIAGNOSES

1. *Primary disease.*

Carcinoma of the head of the pancreas with metastases to the liver.

2. *Secondary or terminal lesions.*

Operation wound, cholecystogastrostomy.
Hemorrhage into the gastro-intestinal tract.
Hemoperitoneum.
Dilatation of the extra- and intrahepatic bile ducts and of the pancreatic duct.
Jaundice.
Hydrothorax, right.
Arteriosclerosis, moderate coronary and aortic.

3. *Historic landmarks.*

Pulmonary atelectasis, right lower lobe.
Chronic fibrous pleuritis, bilateral.

PATHOLOGIC DISCUSSION

DR. MALLORY: There is one point to be considered in relation to the dye retention test in these cases, and that is that a certain proportion of cases of cancer of the pancreas, certainly less than one in five, probably nearer one in ten, will develop a fairly marked degree of biliary obstructive cirrhosis. Slight degrees of biliary cirrhosis are almost invariable where there has been bile stasis running up to three months or more. If the stasis has lasted six or more months one begins to get a quite significant degree of cirrhosis, and if the stasis is combined with cholangitis, this time factor may be considerably shortened. So that a significant degree of cirrhosis can be expected in, I should say, somewhere between one in five and one in ten cases of prolonged jaundice, and that in itself can easily account for a fairly marked dye retention.

We found here a large carcinoma of the head of the pancreas. If there was anything in the stomach we completely missed it. There was nothing in the large intestine. The gall bladder had been anastomosed to the stomach, and there was hemorrhage from the line of anastomosis. The entire stomach was filled with blood. That is almost the commonest cause of death in these cases in which a cholecystgastrostomy has been done. A large proportion of them, it seems to me, bleed to death. The liver was at the time of autopsy also three fingers down below the costal margin, but when we actually came to take it out it weighed only 1500 grams, which is not enlarged at all. The intrahepatic bile ducts were distinctly dilated. There was a considerable degree of infiltration of metastatic nodules throughout the liver. I do not think it is possible, from looking at a liver of that sort, to say whether or not they interfered with function. One can have a great deal of liver pathology without interfering with function, and a relatively small amount may, on another occasion, produce evident insufficiency. It largely depends on how diffuse the process is.

There was nothing else of any great significance,—a moderate amount of arteriosclerosis, a chronic pleuritis, and a terminal pulmonary atelectasis.

DR. CABOT: Where was the chronic pleuritis? Dr. Hampton noted it at the apices in his films.

DR. MALLORY: On both sides.

DR. CABOT: Did it go up to the apices particularly?

DR. MALLORY: Yes, to both apices, but particularly on the right.

DR. CABOT: Nothing in the lungs themselves?

DR. MALLORY: Nothing except the atelectasis.

DR. HAMPTON: Do you often see metastasis to the lungs in cancer of the pancreas, or is "often" too much?

DR. MALLORY: "Often" is too much, I think; certainly occasionally.

DR. HAMPTON: Dr. Holmes told us about two or three cases he had seen where the first lesion discovered was metastasis in the lung.

CASE 19262

AN UNUSUAL CASE OF PROLONGED INTRACRANIAL PRESSURE WITH BOTH CEREBRAL AND CRANIAL NERVE INVOLVEMENT

Neurological and Neurosurgical Departments

Presentation of Case

Dr. Robert A. Gregory*: A white American housewife thirty-six years old was admitted to this hospital from a neighboring hospital with a diagnosis of brain abscess.

The illness began two years before entry, when her menses disappeared at the age of thirty-three years. The first symptom was quite severe headache over the left eye, radiating to the occiput. This occurred about once a month, at the time her menses should have appeared, and lasted fifteen to thirty minutes. About a year and a half before entry the headache became more severe, sometimes awakening her. On two or three occasions she had vertigo and unconsciousness for "a few" minutes. One year before entry she had blurring of vision, supposedly corrected by glasses. Eleven months before entry her appendix was removed at the hospital mentioned. Since that time she had lost appetite and gone gradually downhill. The incidence of headache increased and occasionally was accompanied by vomiting. Three months before entry the headache became constant and she became so weak that she had to go to bed, where she remained until she entered the hospital. One month before entry she reëntered the neighboring hospital for study. She said that she had lost fifty pounds in the past year, also that she has been unable to smell anything for the past two or three years.

The family history is irrelevant.

Past history. She had had Bright's disease with a residual nocturia three or four times at night and urine of low specific gravity. She had had convulsive seizures from the age of twenty-two to twenty-nine years which stopped spontaneously six years before admission.

At the hospital from which she was transferred she was found to have choked disks and left facial weakness. Lumbar puncture showed increased pressure. The spinal fluid showed 80 to 90 lymphocytes. There was a negative chest film. She had no fever, leukocytosis or anemia. The specific gravity of the urine was always below 1.014. There was a constant eosinophilia of 12 to 14 per cent. Schilling's test was done often on the blood; there was never any shift to the left.

On examination at this hospital she was noted to be very pale, with generalized weakness and a smooth red tongue. There were bilateral perforations in Shrapnell's membrane, but no discharge. There was complete anosmia. There were bilateral choked disks. The right was blurred, the left three diopters. There was hypoesthesia of the two upper divisions of the left fifth nerve. The right knee jerk was greater than the left. The right ankle jerk was present, the left absent. The plantar reflexes were not tested. Those were all the positive physical findings.

X-ray examination showed nothing but considerable sclerosis of the left mastoid and generalized chronic infection, thickening of the mucosa of the accessory sinuses.

The laboratory reports showed the specific gravity of the urine to be 1.005. The white blood cell count was 9,100 to 6,400, the red cell count 5,410,000, the hemoglobin 80 per cent. There was nothing in the smear that was abnormal save the six per cent eosinophilia.

A lumbar puncture was done. The initial pressure was 340. The dynamics were normal. The fluid was xanthochromic and showed a cell count of 70 lymphocytes, 7 monocytes and 4 red blood cells. The total protein was 526. The colloidal gold test showed a middle curve. The sugar was 30.7, the chlorides were 672; both low. A smear was made for polymorphonuclears; none were found. A second lumbar puncture showed very similar findings. Because of the low chlorides and sugar a guinea pig was inoculated. On account of the eosinophilia an echinococcus allergy test was done and was negative. On account of the appearance of the tongue gastric analysis was done; it showed no free hydrochloric acid. A Hinton test was negative. The sedimentation rate was 14 millimeters in one hour.

She was transferred to the Surgical service for a combined ventriculolumbar puncture, which showed low pressure, both lumbar and ventricular. The fluid obtained from the ventricle was xanthochromic and clotted in a very short time. The sugar was very low, the total protein very high, 1340. The chlorides were consistently low, 667 to 664.

The day following this puncture the patient passed away within fifteen minutes of having appeared perfectly normal.

*Resident on the Neurological service.

Clinical Discussion

Dr. Harry C. Solomon: In retrospect, knowing what the autopsy showed, it is all very clear. I think we should reserve any comments until after Dr. Mallory has discussed the pathology. I should like to say however that the residents, the house officers and the medical students were interested in tuberculosis as a possible diagnosis and all the visiting staff were uninterested in it.

CLINICAL DIAGNOSIS (FROM HOSPITAL RECORD)

Possible brain tumor, unlocalized.

ANATOMIC DIAGNOSES

Tuberculosis of the brain and meninges.
Pulmonary tuberculosis, healed.
Questionable active tuberculosis of the bronchial glands.
Arteriosclerosis, slight aortic.
Operative wounds, trephine and puncture of the lateral ventricles.
Postoperative hemorrhage, extradural.

PATHOLOGIC DISCUSSION

DR. TRACY B. MALLORY: The autopsy showed practically nothing in the body except for the intracranial findings.

There was a fairly definite but apparently quite inactive pulmonary tuberculosis, and we noticed that the bronchial glands were rather unusually large for adult tuberculosis. A few of them were caseous and looked as though there still might be some degree of activity. The lesions in the lungs seemed to be entirely calcified and healed.

The interesting findings were intracranial. Dr. Kubik will tell you about them.

DR. CHARLES S. KUBIK: Along the superior longitudinal sinus there are three hard flattened nodules which microscopically are tuberculous. The largest is about two centimeters in diameter. They are adherent to the dura and the pia arachnoid but do not seem to infiltrate in the brain. There are tubercles scattered over the base of the brain, the optic chiasma and the infundibulum. These smaller lesions appear to be beneath the pia, or at any rate to extend into the brain tissue. The choroid plexus of the fourth ventricle is indurated, adherent, and is probably involved in a tuberculous process. On sectioning the brain a nodule 3 millimeters in diameter and several smaller elevations are found on the ependymal surface of the third ventricle.

As for the lateral ventricles, there may be slight symmetrical enlargement, the ependymal lining is smooth, no lesions are noted in the choroid plexus, and the foramina of Monro are both patent and of equal size. The aqueduct of Sylvius is patent.

Microscopic section of one of the larger nodules from the region of the superior longitudinal sinus reveals many tubercles with giant cells and fairly large amounts of fibrous tissue. Other sections show tuberculous lesions of the choroid plexus of the fourth ventricle, both gasserian ganglia, and an intramedullary lesion in the peripheral portion of the medulla. There is comparatively little cellular exudation in the subarachnoid space.

The findings differ from those usually observed in tuberculous meningitis in that they consist of fairly well localized tubercles of the meninges and brain with scarcely any diffuse meningeal exudate.

DR. SOLOMON: In retrospect the whole thing seems to be a little more simple. I am wondering whether there could be an old tuberculous process accounting for the epileptic attacks which went on for six or seven years but which dated back a number of years. Possibly she had an old irritative lesion which had healed, because there is a great tendency for healing.

The picture of the gasserian ganglion is very adequate to explain the hypoesthesia of the face. It evidently started with the combination of pain and lessening sensibility. The pain disappeared pretty well with the destruction of the ganglion cells.

We have no examination of the spinal cord, therefore there is no good explanation why she had absent reflexes in the left knee and ankle. Presumably there was some involvement of the posterior roots, I suppose, curiously enough, without distinct pain.

The thing that seems very unusual is that with the number of tuberculous lesions in the neighborhood of the meninges there was no widespread meningeal tuberculosis.

The increased pressure I suppose can be accounted for either on the basis of more changes in the choroid plexus or more blocking off than appears at the time of autopsy. I say that because with each subsequent lumbar puncture the spinal fluid pressure dropped as if something had been released and there was no longer great pressure as there had been. The other possibility is interference with the longitudinal sinus where the larger lesion lay.

The fluid was distinctly yellow. That I suppose is not completely explicable on the basis of what we have seen. I do not know why it should have been yellow unless there were some blocks not apparent on examination.

In reviewing the case the thing that stands out is that we should have laid more stress on the low sugar content of the spinal fluid. That is the one thing that was definite, and it should have been very suggestive of tuberculosis. As I have said, it was suggestive to some of the men and a guinea pig was inoculated on that basis.

The other slip that is quite definite is that we relied upon the x-rays of the chest. We found nothing clinically, but having a report from a neighboring hospital of negative chest films we let that slide. We might have found at least evidence of old tuberculosis if they had been repeated.

Finally, we did not have a tuberculin test. That was a slip, because it had been ordered and somehow had been passed by.

DR. HENRY R. VIETS: This autopsy is unu-

sually enlightening, perhaps more so than almost any case I have had a chance to see, because although I knew this patient for many months and she was carefully studied in a neighboring hospital we never made a correct diagnosis. All we could say was that she had signs of increased intracranial pressure. We presumed that she had a brain tumor, although the findings in the spinal fluid showed an inflammatory reaction in that there were always considerable numbers of cells, a very high protein content and a tendency towards a low amount of sugar.

Tuberculosis should have been considered more definitely I think in view of the chronicity of the condition. The epileptic attacks which she had many years ago and which stopped seven or eight years before admission probably could be accounted for on this basis.

It is unusual to find cerebrospinal meningeal tuberculosis running such a chronic course as this. We see a good many cases of acute meningeal tuberculosis with miliary tuberculous lesions, but it has not been my experience to see such a chronic intracranial disease in any previous patient.

I might say that the x-rays of the chest done at another hospital were, so far as I could see, and according to the report, entirely free from signs of tuberculosis.

A PHYSICIAN: I should like to ask about her eosinophilia.

DR. MALLORY: We found nothing to account for it.

It is certainly an unusual case of meningeal tuberculosis. Solitary tubercles, usually in the brain substance, are by no means uncommon, especially in younger persons. But in a patient of thirty to find a number of localized, well formed tubercles in the meninges is something I cannot remember seeing before.

DR. KUBIK: Some time ago Dr. Hodgson removed a very large tuberculoma from the brain of a patient who had symptoms of an intracranial tumor. The patient made a good recovery and was alive the last time I heard about her, eighteen months or so after operation. The histologic appearances there were similar to those of the fibrous nodules along the longitudinal sinus in this case, indicating apparently tuberculosis with a tendency to heal.

The New England
Journal of Medicine

SUCCESSOR TO
THE BOSTON MEDICAL AND SURGICAL JOURNAL

Established in 1828

Published by THE MASSACHUSETTS MEDICAL SOCIETY under the jurisdiction of the

COMMITTEE ON PUBLICATIONS

R. I. LEE, M.D., *Chairman* HOMER GAGE, M.D.
R. B. OSGOOD, M.D. R. M. SMITH, M.D.
F. H. LAHEY, M.D.

EDITORIAL STAFF

REID HUNT, M.D. STEPHEN ROSHMORE, M.D.
JOHN P. SUTHERLAND, M.D. HANS ZINSSER, M.D.
GEORGE R. MINOT, M.D. BENJAMIN WHITE, PH.D.
FRANK H. LAHEY, M.D. HENRY R. VIETS, M.D.
SHIELDS WARREN, M.D. ROBERT N. NYE, M.D.
GEORGE L. TOBEY, JR., M.D. ROBERT M. GREEN, M.D.
C. GUY LANE, M.D. CHARLES C. LUND, M.D.
WILLIAM A. ROGERS, M.D.

WALTER P. BOWERS, M.D., *Managing Editor*

ASSOCIATE EDITORS

GEORGE G. SMITH, M.D. WILLIAM B. BREED, M.D.
JOSEPH GARLAND, M.D.

THE NEW HAMPSHIRE MEDICAL SOCIETY
PUBLICATION COMMITTEE

D. E. SULLIVAN, M.D. H. H. AMSDEN, M.D.
R. H. MARCOTTE, M.D.

THE VERMONT STATE MEDICAL SOCIETY
PUBLICATION COMMITTEE

WILLIAM G. RICKER, M.D. C. F. DALTON, M.D.
E. A. STANLEY, M.D.

SUBSCRIPTION TERMS: *$6.00 per year in advance, postage paid for the United States, Canada $7.04 per year, $8.52 per year for all foreign countries belonging to the Postal Union.*

Material for early publication should be received not later than noon on Saturday. Orders for reprints must be sent to the Journal office, 8 The Fenway.

The Journal does not hold itself responsible for statements made by any contributor.

Communications should be addressed to The New England Journal of Medicine, 8 The Fenway, Boston, Mass.

GENERAL PRACTICE VERSUS SPECIALISM

THE general practitioner seems at last—or again—to be coming into his own. The old-fashioned family doctor with a Boston in lieu of a saddle-bag is about to ride into harbor on a high tide of renewed popular sentiment, if general wishes are in truth fathers of accomplished facts. Not long ago a rare collection of representatives of the genus was exhibited in order to stimulate the emotions and relax the purse strings of the general public; the motive was worthy and the applause which thundered at the time is even now reëchoing with increased volume from the elevated rims with which every depression must be surrounded.

Any movement to replace the general practitioner in his accustomed sphere of unparalleled usefulness deserves our heartiest approbation and should win our active support. At his best—and we have all known and still know him at his best—he is an indispensable part of the sturdy organization of our highest type of community and family life, loved, respected and honored. At his worst he is no better than the worst in any other respectable field of activity. Let us do honor to the family doctor, but let us do it with the minimum of maudlin sentimentality which our national characteristics demand. The general practitioner, with a decent amount of encouragement, support and advertisement (not self-advertisement) will win exactly the place in the life of the community which he deserves, personally and according to the laws of economic demand.

Unfortunately our descriptive ability (as a nation) runs toward antithesis. Despite repeated warnings concerning the odium of comparison, we cannot praise on the one hand without damning on the other. We cannot polish up the family doctor without throwing a little soot on the specialist, not that we have anything in particular against the specialist, per se, but that the family doctor, the object of our present exuberance, shines a little more brightly against a dingy background. We are not perfect; perhaps a little timidity is part of our imperfection, for the man who bore charity for all and malice toward none was assassinated for his trouble in the matter.

The good general practitioner, as a matter of fact, probably bears little or no malice at all toward the good specialist. Excellence in any field seems to recognize and respect excellence in any other. The specialists, some of them—not as a class—have not been at all without fault. They have sometimes slipped into the seats of the mighty inadequately prepared for the confidence they hoped would be reposed in them; they have valued their services more highly than their services merited; they have, pharisaically, adopted a patronizing attitude toward their front trench brothers, and that no man of spirit can brook. Let it be said of the specialists at least that they have begun the purging of their ranks from within. Let it not be forgotten also that with the broadening of the scope and the deepening of the knowledge of medicine, we cannot progress or even hold up the torch without them.

The general practitioner cannot be wafted into a position of esteem and usefulness by popular acclaim if the position does not exist or if he does not deserve it; he cannot take the place of one who, by special training or aptitude, fits into a smaller though deeper niche. Rather must they work hand in hand and side by side, each recognizing and utilizing the abilities of the other if our profession is to be advanced and our public served.

A QUESTION RESPECTING THE FUTURE OF DR. GEORGE H. BIGELOW

THE announcement in a Boston daily paper recently that "Dr. George H. Bigelow, Massachusetts Commissioner of Public Health may be chosen to succeed Dr. Frederic A. Washburn as Director of the Massachusetts General Hospital" created consternation in the minds of those who have been conversant with public health affairs in this State.

Having recently been reappointed by Governor Ely there was a feeling of security about public health affairs for several future years among those who are most familiar with the policies of Dr. Bigelow.

Although his energy coupled with vision respecting the problems of disease has often carried his activities beyond more conservative procedures he has won the respect and confidence of those best able to judge of the soundness of his programs. It was inevitable that some misunderstanding of his plans and misinterpretation of his motives should have been shown when private interests were not allowed to stand in the way of progress as he saw it, but even under criticism and coördinated opposition he never retreated, played favorites, or lost his poise or enthusiasm.

If this opportunity of a life of an executive administrator of a large corporation is open to Dr. Bigelow no one would urge him to relinquish it, for to men of ideals it is often exasperating to live in the seething political atmosphere of a state administration. Many great and good men cannot in justice to themselves and their families permanently give up the greater rewards which their talents will surely bring. If the arrangements have been made for Dr. Bigelow to direct the affairs of the Massachusetts General Hospital we will congratulate the Hospital and trust that another equally good public health administrator will be secured for Massachusetts. Dr. Washburn's successor will find an admirable hospital with a Staff inspired by the example of those who have placed medicine on a sound foundation and an organization which assures success in ministering to the needs of the people in times of illness. The hospital has not only maintained the prestige of its high purpose, under Dr. Washburn, but has been ready to adapt its policies to changes in service which have been indicated by the demands of the times.

If the consideration of Dr. Bigelow as Dr. Washburn's successor is followed by his election the medical profession will give its approval, but the State will lose an able and conscientious public servant.

It will be confidently expected that Dr. Washburn's influence in medical affairs will not be withdrawn because of his retirement from the hospital, but rather that he will give the same gracious and helpful assistance which has been freely rendered in the past when important medical policies have required consideration.

THIS WEEK'S ISSUE

CONTAINS articles by the following named authors:

FROTHINGHAM, CHANNING. A.B., M.D. Harvard University Medical School 1906. Physician-in-Chief, Faulkner Hospital. Associate Clinical Professor of Medicine, Harvard University. His subject is "The Trend of Medicine in the Twentieth Century." Page 1337. Address: 1153 Center Street, Jamaica Plain, Mass.

RACKEMANN, FRANCIS M. M.D. Harvard University Medical School 1912. Instructor, Harvard Medical School. Physician, Massachusetts General Hospital. His subject is "The Rôle of Allergy in Arthritis." Page 1347. Address: 263 Beacon Street, Boston.

GALLUPE, H. QUIMBY. M.D. Harvard University Medical School 1918. F.A.C.S. Visiting Surgeon to Waltham Hospital. His subject is "Our Later Heritage." Page 1352. Address: 751 Main Street, Waltham, Mass.

FRIEDENWALD, JULIUS. A.B., A.M., M.D. College of Physicians and Surgeons, Baltimore, 1890. F.A.C.P. Professor of Gastro-Enterology, University of Maryland. President, Baltimore City Medical Society. Address: 1013 N. Charles Street, Baltimore, Maryland. Associated with him is

MORRISON, SAMUEL. A.B., M.D. Johns Hopkins University School of Medicine 1929. Address: 1013 N. Charles Street, Baltimore, Maryland. Their subject is "A Clinical Study of Aerophagia." Page 1360.

BOLDUAN, NILS W. A.B., Student, Cornell Medical College in New York City (when paper was submitted for publication). His subject is "Chaucer and Matters Medical." Page 1365. Address: 603 West 111th Street, New York City.

SHELDON, RUSSELL F. A.B., M.D. Harvard University Medical School 1911. Assistant Anesthetist, Massachusetts General Hospital and Massachusetts Eye and Ear Infirmary. His subject is "Progress in Anesthesia in 1932." Page 1369. Address: 31 Pinckney Street, Boston.

MISCELLANY

DR. HARVEY CUSHING ACCEPTS APPOINTMENT AT YALE

The *Boston Post* has made public that President James Rowland Angell, of Yale University, has announced the acceptance by Dr. Harvey Cushing of the Sterling Chair of Neurology at the Yale School of Medicine. This position was created by a gift of $300,000 from the Estate of John W. Sterling. It is expected, according to the announcement, that Dr. Cushing will engage in research work in the laboratories of the Sterling Hall of Medicine.

THE DEGREE OF DOCTOR OF SCIENCE CONFERRED ON DR. L. E. PHANEUF

The degree of Doctor of Science was conferred upon Dr. Louis E. Phaneuf, Professor of Gynecology, Tufts College Medical School, at the seventy-seventh Commencement of Tufts College.

AN HONOR TO THE MEMORY OF DR. LAWRIE B. MORRISON

Among the honorary degrees conferred by the University of Vermont at its one hundred and twenty-ninth Commencement was that of Sc.D. Post Obitum to Dr. Lawrie B. Morrison.

MORTALITY RATES

Telegraphic returns from 85 cities with a total population of thirty-seven million for the week ending June 3, indicate a mortality rate of 10.0 as against a rate of 10.7 for the corresponding week of last year. The highest rate (15.7) appears for New Haven, Conn., and the lowest (3.9) for Yonkers, N. Y. The highest infant mortality rate (13.7) appears for Waterbury, Conn., and the lowest for Camden, N. J., Canton, Ohio, Cincinnati, Ohio, Des Moines, Ia., Erie, Pa., Evansville, Ind., Kansas City, Kans., Long Beach, Calif., Lowell, Mass., South Bend, Ind., Syracuse, N. Y., and Yonkers, N. Y., which reported no infant mortality.

The annual rate for 85 cities is 11.7 for the twenty-two weeks of 1933, as against a rate of 12.3 for the corresponding period of the previous year.—*Bureau of the Census.*

CORRESPONDENCE

SUGGESTIONS TO PREVENT WASTE OF TIME AT COUNCIL MEETINGS

Editor, New England Journal of Medicine,

The terrific length of the last meeting of the Council and Dr. Birnie's comments on the time consumed in considering petitions for the reinstatement of members lead me, a Councilor since 1902, to speak of certain possible improvements in management.

1. Why can the meeting not start promptly at 12:00? It almost never begins before 12:15 or even 12:20. In the last twenty years I have presided at over one thousand meetings of a bank's board of investment (once every week) and every three months at a meeting of the trustees. These meetings begin promptly as scheduled and those not there are unlucky.

2. Why must the Secretary read, even in abstract, the record of the previous meeting? It has already been printed and distributed. In most organizations this reading is on motion dispensed with.

3. Should the presiding officer not familiarize himself before the meeting with the names of his nominees for committee positions?

The Council under conditions suggested would have been ready for other business certainly by 12:10 instead of 12:30 or 12:35.

At 3:30 P.M. I for the first time in my life went home before adjournment seeing no probable termination of a debate between two distinguished surgeons entirely uncontrolled by the chair.

When adjournment was finally achieved I do not therefore personally know, but two and one-half hours had already gone by with an extra hour for luncheon and a camera interlude.

Not one half of those present before luncheon attended the afternoon meeting.

Sincerely yours,

SAMUEL B. WOODWARD, M.D.

THE DISTRIBUTION OF POLIOMYELITIS CONVALESCENT SERUM

The Commonwealth of Massachusetts
Department of
Public Health
State House, Boston

June 22, 1933.

Editor, New England Journal of Medicine,

In order that convalescent infantile paralysis serum may be readily available for the treatment of preparalytic cases, this Department has furnished a small supply of this serum to certain hospitals which treat such cases. I am enclosing a copy of this list. Unfortunately, owing to the limited supply, serum could not be furnished to every hospital. These have been so selected, however, as to serve all sections of the State. Although intended primarily for the treatment of hospital cases, this serum is available for physicians known to the hospital who may have a case within their private practice upon signing a receipt for the same, indicating the results of the spinal puncture, and certifying as to the absence of paralysis.

For those physicians who wish to avail them-

selves of the diagnostic consultation service which has been available in former years, arrangements have been made for its continuation this year. Request for this assistance may be made either to the State Department of Public Health, Capitol 4600, during office hours, or through Kenmore 8100 at other hours.

Yours truly,

GEORGE H. BIGELOW, M.D.,
Commissioner of Public Health.

HOSPITALS AND OTHER AGENCIES PARTICIPATING IN DISTRIBUTION AND USE OF POLIOMYELITIS CONVALESCENT SERUM—1933

District	City or Town	Hospital
I		
Dr. R. P. MacKnight 601 First National Bank Bldg. New Bedford Tel. Clifford 1253	Attleboro	Sturdy Memorial
	Brockton	Brockton Hospital
	Fall River	Fall River General
	Nantucket	Nantucket Cottage
	New Bedford	St. Luke's Hospital
	Oak Bluffs	Martha's Vineyard
	Plymouth	Jordan Hospital
	Taunton	Morton Hospital
Barnstable County Dr. A. P. Goff Hyannis Tel. Hyannis 593-W	Pocasset	Barnstable County Sanatorium
	(For inquiries as to additional service address Dr. A. P. Goff, Hyannis, Tel. Hyannis 593-W.)	
II		
Dr. C. B. Mack 44 Stanton Road Brookline Tel. Reg. 7990-W	Boston	Boston City Hospital South Department
	"	Boston Dispensary (Out-Patient only)
	"	Floating Hospital
	"	Carney Hospital
	"	Children's Hospital
	"	Massachusetts Memorial (Haynes Memorial)
	"	Massachusetts General
	Cambridge	Cambridge Hospital
	Framingham	Framingham Hospital
	Malden	Malden Contagious
	Newton	Newton Hospital
	Waltham	Waltham Hospital
III		
Dr. R. E. Archibald 18 Bassett Street Lynn Tel. Jackson 2754	Beverly	Beverly Hospital
	Gloucester	Addison Gilbert Hospital
	Haverhill	Haverhill Contagious
	Lawrence	Lawrence General
	Lowell	Lowell General
	Lynn	Lynn Hospital
	Newburyport	Anna Jaques Hospital
	Salem	Salem Isolation
IV		
Dr. O. A. Dudley 476 Main Street Worcester Tel. Wor. 28805	Fitchburg	Burbank Hospital
	Gardner	Henry Heywood Memorial
	Worcester	City Hospital
Nashoba Area Dr. J. O. Wails Town Hall, Ayer Tel. Ayer 12	Ayer	Nashoba Associated Boards of Health

V

Dr. H. E. Miner	Holyoke	Providence Hospital
145 State Street	"	Carpenter Isolation
Springfield	"	Holyoke Hospital
Tel. Spfld. 21279		*(Skinner Clinic)
	Northampton	Cooley Dickinson
	Springfield	Mercy Hospital
	"	Springfield Hospital
	"	Springfield Isolation
	Ware	Mary Lane Hospital

*For diagnosis and treatment in Out-Patient only.

VI

Dr. W. W. Lee	Greenfield	Franklin County Isolation
400 New Kimbell Bldg.	North Adams	North Adams Hospital
85 Main Street	Pittsfield	House of Mercy
North Adams		
Tel. No. Adams 551		
South Berkshire Area	Great Barrington	South Berkshire Health District
Dr. H. W. Stevens		
54 Castle Street		
Great Barrington		
Tel. Gt. Bar. 760		

RECENT DEATHS

MITCHELL — HARRY WALTER MITCHELL, M.D., Superintendent of the Warren State Hospital, died at his home in Warren, Pennsylvania, June 13, 1933, following an illness of several months.

Dr. Mitchell was born in Plymouth, New Hampshire, in 1867. He attended the high school at Malden, Massachusetts, St. Johnsbury Academy and Peacham Academy in Vermont. He next entered the medical department of the University of Vermont and was graduated in 1896. In 1902 he married Miss Mary Paulsell, a physician, who survives him.

He has held numerous institutional positions, having been Assistant Physician at the Bridgewater (Mass.) State Asylum for Insane Criminals; Superintendent of the Danvers (Mass.) State Hospital; Superintendent of the Bangor (Maine) State Hospital; Consulting Neuropsychiatrist at the Eastern Maine General Hospital in Bangor, and, since 1912, Superintendent of the Warren (Pa.) State Hospital.

He was admitted to the American Neurological Association in 1912, was President of the Essex County (Massachusetts) Medical Society, Secretary-Treasurer of the American Psychiatric Association (1918-21) and President of the same Society (1923). He was Trustee of the Pennsylvania State Medical Society. He belonged to the Massachusetts Medical Society, Boston Society for Psychiatry and Neurology, Philadelphia Psychiatric Association, Philadelphia Neurological Society, Pittsburg Neurological Society, New England Psychiatric Society, American Psychopathological Association, American Medical Association, American Institute of Criminal Law and Criminology, and Association for Research in Nervous and Mental Diseases.

Dr. Mitchell has contributed many articles to the scientific journals.

In June, 1931, he was awarded the honorary degree of Doctor of Science by the University of Vermont.

MORSE — IRENE MAY MORSE, M.D., of Clinton, Massachusetts died in that town June 20, 1933. She was born in 1867, graduated from the Salem Normal School and later was a member of the faculty of the University of Wyoming at Laramie. Her medical education was acquired at the Tufts College Medical School where she graduated in 1906. Dr. Morse served as Superintendent of the Clinton Hospital for a short time before engaging in private practice in Clinton.

She was the first New England woman physician to serve with the medical corps of the Red Cross in France during the World War. While caring for the wounded she was "gassed" and developed a serious pulmonary affection which necessitated return to the United States. Her health was never fully regained. She joined the Massachusetts Medical Society in 1910 and resigned in 1933.

NEWHALL — HERBERT WILLIAM NEWHALL, M.D., of 82 Broad Street, Lynn, Massachusetts, died in that city, June 18, 1933. He was born in Lynn in 1858 the son of Edward and Eliza Fisher (Beaumont) Newhall. His early education was in the Lynn Public Schools and he graduated from Harvard College in 1879 and the Harvard Medical School in 1884. His interne service was at the

Massachusetts General and the Boston Lying-In Hospitals. He subsequently studied in Europe. Dr. Newhall served as State Associate Medical Examiner having been appointed in 1898. He joined the Massachusetts Medical Society in 1886 and resigned in 1929 and was a Fellow of the American Medical Association and a member of the Massachusetts Medico-Legal Society. He served on the School Committee for eight years.

He is survived by his wife, Alice L. (Davis) Newhall, and a son, Beaumont Newhall.

YENETCHI—Henry Ainsworth Yenetchi, M.D., of Somerville, Massachusetts, died at the Lawrence Memorial Hospital, Medford, Massachusetts, June 8, 1933. He was born in Charlestown in 1856 and attended the public schools of that district, later studying medicine in the Harvard Medical School and the University of Vermont Medical School, and graduated from the latter in 1879. He joined the Massachusetts Medical Society in 1897 and retired in 1928. His associates report that he left no living relatives.

GATES—Frederick Lamont Gates, M.D., instructor in general physiology at Harvard College, died June 5, 1933, the result of injuries due to a fall. He was born in Minneapolis in 1886 and after graduating from Yale in 1909 received his M.D. degree from Johns Hopkins University Medical School in 1913. His interest was in research work and he had been engaged in the field with the Rockefeller Institute and at the Harvard Medical School. He had contributed articles to the Journal of Medical Research and other publications. He is survived by his widow, Mrs. Dorothy (Olcott) Gates, and five children.

O'KEEFE—Daniel Thomas O'Keefe, M.D., of 28 Glen Road, Jamaica Plain, died June 22, 1933, aged sixty-six years. He was born in Quincy, son of the late John and Mary (Murray) O'Keefe. He graduated in medicine from the College of Physicians and Surgeons of Baltimore in 1892 and joined the Massachusetts Medical Society in 1899 and was a Fellow of the American Medical Association. He practiced in Jamaica Plain for about forty years.

Dr. O'Keefe was a member of the Jamaica Plain Council and of Bishop Cheverus' Fourth Degree, Knights of Columbus. He was a brother of the late John J. O'Keefe of St. Cecilia's Church. He is survived by his widow, Catherine F. (Allen) O'Keefe, and a brother, Timothy O'Keefe.

NOTICES

CORRECTION

It was stated in This Week's Issue, page 1324, issue of June 22, that Dr. Halbert G. Stetson received his M.D. degree in 1896. This should have read 1895.

REMOVALS

A. Harold Radin, M.D., announces the removal of his office to 484 Commonwealth Avenue, Boston, Mass.

Juanita P. Johns, M.D., announces the removal of her office to 313 Commonwealth Avenue, Boston.

BOOK REVIEW

The Differential Diagnosis of Endocrine Disorders. By Allan Winter Rowe. Published by The Williams & Wilkins Company. Price $4.00.

In this day when the isolation and even crystallization of new hormones are almost becoming an everyday occurrence, when groups of cases are being classified as hyper- or hypo- in respect to some internal secretion as the result of some definite measurement such as the biological evaluation of the hormone content or some body fluid, and when countless new endocrinological advances are being made, a publication with the above title is sure to be seized upon by the practicing physician for orientation purposes. Unfortunately he will be disappointed. The monograph is reputed to represent the experience of twenty years at the Evans Memorial and consists largely of a statistical classification of endocrine cases. The routine method of study used at that institution is given in detail. This has apparently not been influenced by the many advances in the outside world. Thus, to quote one example only, the statement is made that little is known about diseases of the parathyroid glands and in support of this an article published in 1924 is quoted as a "recent treatise". Endocrine knowledge has almost doubled since 1924; parathyroid knowledge has tripled.

For the physician who wishes to become oriented on that branch of endocrinology which has to do with sex and reproduction, the reviewer cannot recommend too highly the publication, sponsored by the Committee for Research in Problems of Sex of the Division of Medical Sciences of the National Research Council, entitled, "Sex and Internal Secretions," and edited by Dr. Edgar Allen (Williams & Wilkins Co., Baltimore, 1932).

SOCIETY MEETINGS, CONGRESSES AND CONFERENCES

July 24-31—The IVth International Congress of Radiology. See page 1071, issue of May 18.

August 10, 11, 12—American Delegation to the International Goiter Conference. See page 768, issue of April 6.

August 13-27—Courses at the Tomarkin Foundation. See page 1070, issue of May 18.

September 25-30—The American Congress of Radiology. See page 1224, issue of June 8.

September 29 and 30—New England Surgical Society. See notice on page 1232, issue of June 8.

October 9-12—American Public Health Association. See page 1175, issue of June 1.

October 23 - November 3—The 1933 Graduate Fortnight of the New York Academy of Medicine. See page 1071, issue of May 18.

April 16-20, 1934—The American College of Physicians. See notice on page 970, issue of May 4.